MANDATORY DISCLOSURES

1.Name and address of the Institution

Tamilnadu College of Engineering,
Palanisame Ravi Nagar,
Karumathampatti – post
Coimbatore 641 659.
tce@tnce.in
0421 – 2332588

2. Name and address of Trust

Tamilnadu Technical Education Foundation
Palanisame Ravi Nagar, Karumathampatti - post
Coimbatore 641 659.
tce@tnce.in
0421 – 2334944

3. Name and address of Principal

Name : Dr.M.Karthikeyan
Designation : Principal
Highest Degree : Ph.D.,
Specialisation : Computer And Information Technology
Address : No. 50, Shakthi Nagar, 3rd Street, Kavundampalayam, Coimbatore - 641 030
Principal@tnce.in
Cell : 9894612700

4. Name of the affiliating University

Anna University Chennai, Guindy – 600 025
www.annauniv.edu

5. Governance

Governing council

Name	Position	Qualification	Present Designation / Occupation	Telephone Numbers	Mobile No.	E-mail id	Address
Dr. Anusha R	Members	Ph.D.-Computer Science and Engineering	Trustee	0421 - 2332588	9944005555	anusha@park.ac.in	36, K P N Colony, 1st Street, - Tiruppur - 641601 Tiruppur
Mr. Karthikeyan R	Members	M.B.A.-Master of Business Administration	Assistant Professor	0421 - 2334944	9865899599	ao@tnce.in	1/275, Gobi Main Road, Nanjaipuliampatti, Gobi Taluk - Gobi - 638506 Erode
Dr. Karthikeyan M	Member Secretary	Ph.D.-Others-Computer and Information Technology	Principal	0421 - 2332588	9894612700	principal@tnce.in	50, Shakthi Nagar, III Street, Kavundampalayam - Coimbatore - 641 030 Coimbatore
Dr. Shanthi A.S	Members	Ph.D.-Computer Science and Engineering	Professor	0421 - 2332588	9942288733	babushanthi@gmail.com	6/66, VIP Street, Nambiampalayam - Avinashi - 641 670 Tiruppur
Mr. Karthik T.R	Members	M.E.-Computer Science and Engineering	Trustee	0421 - 2332588	9443724000	tce@tnce.in	36, K P N Colony, 1st Street - Tiruppur - 641 601 Tiruppur
Mrs. Rajamani P	Members	OTHERS-OTHERS-Others-Others	Treasurer	0422 - 2556950	9442206661	sabariceo@gmail.com	20, Jain Manor, West Periasamy Road, R S Puram - Coimbatore 641002 Coimbatore
Mr. Sabarivasa A.P	Members	OTHERS-OTHERS-Others-Others	Secretary and Correspondent	0422 - 6451160	9894341851	sabariceo@gmail.com	83, 84 Ramalingapuram, Vadavalli - Coimbatore - 641 041 Coimbatore
Dr. Ravi P.V	Chairman	Ph.D.-English	Chairman	0421 - 2332588	9943529000	tce@tnce.in	36, K P N Colony, 1st Street - Tiruppur - 641 601 Tiruppur

Academic Council

Name	Position	Category	Qualification	Present Designation / Occupation	Telephone Numbers	Mobile Numbers	E-mail ID	Address
Dr. Karthikeyan M	Chairman	Principal of the College	Ph.D. - Computer and Information Technology	Principal	0421 - 2332588	9894612700	principal@tnce.in	50, Shakthi Nagar, III Street, Kavundampalayam-Coimbatore 641 030 Coimbatore
Dr. Saravanakumar G	Member	Senior faculty member of the College	Ph.D. - Electrical and Electronics Engineering	Others - Professor and Dean in ICE Dept.	0421 - 2332588	8903827798	saravanakumar579@yahoo.com	4/120A, Krishna Nagar, Bethanaickanpalayam-Kallipalayam Post, Coimbatore 641 107 Coimbatore
Mr. Gurunath V.D	Member	Industrial expert in the field of engineering and Technology	B.E. - Instrumentation and Control Engineering	Others - Managing Director Sun Tecknology Chennai	0421 - 2332544	9790935128	vdgurunath@gmail.com	Sri Gruha Villa-405 Zone-12, Lane-25-Pacific Arurum Villas, OMR, Padur, Chennai - 603 103 Chennai
Dr. Krishneswari K	Member	Senior faculty member of the College	Ph.D. - Computer Science and Engineering	Professor	0421 - 2332588	9442615741	cse@tnce.in	103, Bathmakeeran Enclave-Singanallur, Coimbatore - 641 005 Coimbatore
Dr. Mohankumar G	Member	Senoir faculty member from University/other College	Ph.D. - Faculty of Technology	Others - Principal of Park College of Engg. and Tech.	0421 - 2334899	9443743348	info@pcet.ac.in	Park College of Engineering And Technology-Kaniyur, Coimbatore Coimbatore
Mr. Divakar K	Member	Industrial expert in the field of engineering and Technology	B.E. - Instrumentation and Control Engineering	Others - Proprietor Venkateswar Systems	0421 - 2332588	9443131117	divakar94@gmail.com	No. 56, Cheaemyan Street No. 2-Kavundampalayam, Coimbatore – 641 030 Coimbatore
Mr. Sureshkumar D	Member	Architect /Civil Engineer	M.Arch. - Architecture	Others - Director Tamilnadu School of Architecture	0422 - 2911555	9442208932	director@tnsa.ac.in	61A, Thagoor Nagar, Ondipudur-Coimbatore Coimbatore

Anti-Ragging Committee

Sl. No.	Name	Position	Category	Present Designation / Occupation	Telephone Numbers	Mobile Numbers	E-mail id	Address
1	Dr. Karthikeyan M	Chairman	Principal	Principal	0421 - 2332588	9894612700	principal@tnce.in	50, Shakthi Nagar, III Street, Kavundampalayam - Coimbatore - 641030 Coimbatore
2	Mr C. Rajadurai	Member	Police Department	Inspector of Police	0421 - 2333053	9498175401	karumathampattips@gmail.com	Police Station, Karumathampatti - Coimbatore - 641659 Coimbatore
3	Mr. M.Krishnaswamy	Member	Revenue/Taluk/Civil/Officers	VAO	-	9344834956	krishnaswamym@gmail.com	VAO Office, Karumathampatti - Coimbatore- 641659 Coimbatore
4	Dr. Ragunath Parakkal P	Member	Official of NGO	Counsellor	0491 - 2531118	0944708118	tc@tnce.in	Tamilnadu College of Engineering, Karumathampatti - Coimbatore 641659 Coimbatore
5	Mr. Prasanna Venkatesan P	Member	Representatives of Parents	Business	-	9047042460	taxcare2009@gmail.com	1/113 A , MPR Layout, Cheyur Road, Soolai, - Avinashi, Tiruppur - 641654 Tiruppur
6	Mr. Pandian JCS	Member	Representatives of Parents	Business	-	9842779735	lgs3000@gmail.com	125/Park Road, Anumanthapuram - Dharapuram-638656 Tiruppur
7	Mr. S.Yogaraj	Member	Representatives of Students	Student	-	8220943285	yogarajsrini25@gmail.com	9-a, kalyanaraman street, jaganathapuram, ariyamangalam trichy
8	Mr.V.Boopathi	Member	Representatives of Students	Student	-	9498443911	vtboopathi007@ gmail.com	115 katukottai Aanaimaduvu Kallakuruchi
9	Ms. D.Anandhi	Member	Representatives of Students	Student	-	9047042570	anandhi118@gmail.com	1/113 A, MPR Layout, Cheyur Road, Soolai - Avinashi, Tiruppur - 641 654 Tiruppur

10	Ms. E.Pavithra	Member	Representatives of Students	Student	-	7708880430	epavithrah24@gmail.com	3/863, Aadyaa Print and Packs Company Opposite - Velayuthampalayam, Tiruppur - 641 654 Tiruppur
11	Mr. Senthilkumar S.V	Member	Representatives Non-Teaching	Jr. Assistant	0421 - 2332588	9894233977	svskanishka@gmail.com	28/4, Parameswaran Layout, PN Palayam - Coimbatore - 37 Coimbatore
12	Mr. Mr.S.Pattukottai Kalyanasundaram	Member	Representatives Non-Teaching	Turner	0421 - 2332588	8973478080	kalyanasundaram@gmail.com	298, Kongu Managar, Karumathampatti - Coimbatore 641659 Coimbatore

Anti-Ragging Squad

Name	Position	Category	Present Designation / Occupation	Telephone Numbers	Mobile Numbers	E-mail id	Address
Dr. Karthikeyan M	Chairman	Principal	Principal	0421-2332588	9894612700	principal@tnce.in	No.50, Shakthi Nagar, III Street, Kavundampalayam- Coimbatore 641030 Coimbatore
Dr. Seethapathi M	Member	HOD1	Assistant Professor Senior Scale	0421-2332588	9994304379	pathi_seetha@yahoo.co.in	77/103 B, Johnson Pettai, CTC Depot North Side- Karumathampatti, Coimbatore - 641 659 Coimbatore
Dr. Dharmalingam P	Member	HOD2	Associate Professor	0421-2332588	9942082725	dharmalingampmech@tnce.in	28, Lalbhadur nagar, poolamedu post-Coimbatore - 641004 Coimbatore
Dr. Shanthi A.S	Member	HOD3	Associate Professor	0421-2332588	9942288733	cse_hod@tnce.in	6/66, VIP Street, Nambiyampalayam-Avinashi- 641670 Tiruppur
Dr. R.Sivakumar	Member	HOD4	Professor	0421-2332588	9345799075	rsksivame@gmail.com	91A,Duraisamy naidu Layout, Peelmadu. Coimbatore
Mr. Elango C	Member	Faculty members (Preferably 2 Male and 2 Female)	Assistant Professor Senior Scale II	0421-2332588	9942522682	elango284@gmail.com	4/156, Kamatchiamman Kovil Street, Mekkur- Vijayamangalam, Erode Dt- 638056 Erode
Mrs. C. Ruby sharmila	Member	Faculty members (Preferably 2 Male and 2 Female)	Assistant Professor	0421-2332588	9486113074	kavithachem87@gmail.com	Plot no:120,muthu nagar, Opp to KPR mills, Chenniyandavar Kovil- Karumathampatti, Coimbatore - 641 659
Mr. Venkatesh D	Member	Faculty members (Preferably 2 Male and 2 Female)	Assistant Professor	0421-2332588	9994055985	venkateshug@gmail.com	12, Indira Nagar, Uppilipalayam Post- Coimbatore - 641015 Coimbatore
Mrs. Amsaveni R	Member	Non-Teaching Faculty	Lab Technician	0421-2332588	9788575614	amsaa037@gmail.com	311, Sekudanthali Road, Chenniyandavar Kovil- Karumathampatti, Coimbatore - 641 659
Mr. Murugesan N	Member	Non-Teaching Faculty	Lab Technician	0421-2332588	9443743358	murtcecivil@gmail.com	6/758, Indira Nagar, Unjappalayam-Somanur - 641668 Coimbatore

Students Feed Back

Students' Feed back mechanism is available in the Institution, once in a semester the students provide feedback of staff in a prescribed format given below.

Dear students**,**
Kindly fill in the following questionnaire so as to assess the effectiveness of the Teaching Learning Process. Be frank, constructive and creative in your assessment.
Mark **1** for **Below Average**, **2** for **Average**, **3** for **Satisfied**,**4** for **Good** and **5** for **Excellent.**

CLASS:						**DATE:**	
S.No	**Criterion**	**Subject Name** **Faculty Name**	**Subject Name** **Faculty Name**	**Subject Name** **Faculty Name**	**Subject Name** **Faculty Name**	**Subject Name** **Faculty Name**	**Subject Name** **Faculty Name**
1	The Faculty was Punctual						
2	The Faculty Completed the Syllabus						
3	The Faculty clarified the doubts both inside and outside class room						
4	Latest education technology aids were used in a balanced manner						
5	The Faculty encouraged to refer books and other course materials to support self-learning						
6	The assessment was fair and unbiased						
7	The Faculty encouraged to participate in the class room discussion						
8	The course delivery helped to learn the subject matter thoroughly						
9	The Faculty was clear and audible						
10	Focus on contents beyond syllabus and motivation for participation in Extra / Co-curricular activities						
11	The Faculty had Good control over the student inside classroom						

Feedback on Facilities:

S.No	**Criterion**	**Ratings**
1	Are the Laboratories equipped?	
2	Whether the computing facility is adequate?	
3	Are the class rooms properly furnished?	

Rate **1** for **Below Average**, **2** for **Average**, **3** for **Satisfied**,**4** for **Good** and **5** for **Excellent.**

Grievance Redressal Mechanism

The Management follows a transparent system of administration and grievances from staff and students are given at most concentration.
Class committee meetings are conducted through which grievances of students are taken into account and remedial measures are taken.
Grievances regarding staff are carefully looked and remedial measures are taken in consultation with principal and management.
In case of indiscipline, separate committee appointed by principal to enquire the matters by calling witnesses and recommendations are made about the action to be taken by the management.
Complaints and suggestions boxes are kept in various places of the campus.
All the complaints and suggestions are carefully looked into and remedial measures undertaken.

Complaints cum Redressal Committee

Sl.No.	Name	Category	Present Designation / Occupation	Telephone Numbers	Mobile Numbers	E-mail id	Address
1	Dr. Shanthi A.S	HOD	Associate Professor	0421-2332588	9942288733	cse_hod@tnce.in	6/66, VIP Street, Nambiyampalayam-Avinashi- 641670
2	Devi C.P	Member	Warden Girls Hostel	0421-2332588	9894138174	tce@tnce.in	Tiruppur Karumathampatti, Coimbatore 641659 Coimbatore
3	Dr. Dharmalingam P	Member	Associate Professor	0421-2332588	9942082725	dharmalingam72@gmail.com	28, Lal Bahadur Nagar, MKP Road-Peelamedu, Coimbatore - 641 004 Coimbatore
4	Dr. Ragunath Parakkal P	Member	Others-Counsellor	0421-2332588	9447083118	tce@tnce.in	Tamilnadu College of Engineering, Palanisame Ravi Nagar- Karumathampatti, Coimbatore 641659 Coimbatore
5	Mr. Elango C	Member	Assistant Professor	0421-2332588	9942522682	elango284@gmail.com	4/156, Kamatchiamman Kovil Street, Mekkur, Vijayapuri- Vijayamangalam - 638 056 Erode
6	Dr. Latha Shanmugavadivu S	Convener	Professor	0421-2332588	9843520777	ece@tnce.in	112 C, Shanmuga Nivas, V.K. Road, Thanneer Pandhal-Peelamedu, Coimbatore - 641004 Coimbatore

Internal Complaint Committee

A 'Women's Grievance Cell' as per the orders of the Supreme Court (Vishaka Judgement), 'Sexual Harassment at Workplace Act 2013' rules with the aim of endorsing gender equality and women empowerment among students and staff member is constituted in the college.

Objectives:

To create an environment of gender justice where men and women work together with a sense of personal security and dignity
To create awareness amongst students about the issues related to the youth, girls in particular.
To disseminate knowledge about rights and laws related to women.
To create awareness amongst students about the problems faced by women due to gender issues.
To enhance the self-esteem and self confidence of girl students, women faculty and staff.
To foster decision-making ability in girl students for making informed choices in areas like education, employment and health.

S.No.	Name	Category	Designation
1	Dr.A.S.Shanthi,	HOD/CSE Dept.	Chairman
2	Mr.T. Rajthilak	AP/English	Member
3	Mrs.R.Gokila	AP/ICE Dept.	Member
4	Mrs.A.Velumani	Jr.Asst/OFFICE	Member
5	Mrs.M.Shanthi	Receptionist/ OFFICE	Member
6	Ms.A.Jude Martina	Family counselor,YWCA	Member
7	Ms.Manoshanthi	Family counseling center/NGO	Member
8	Ms.A.Akshaya	Student/ECE	Member
9	Ms.S.Sridevi	Student/ECE	Member
10	Ms.S.Harini	Student/CSE	Member

OMBUDSMAN and Grievance Redressal committee

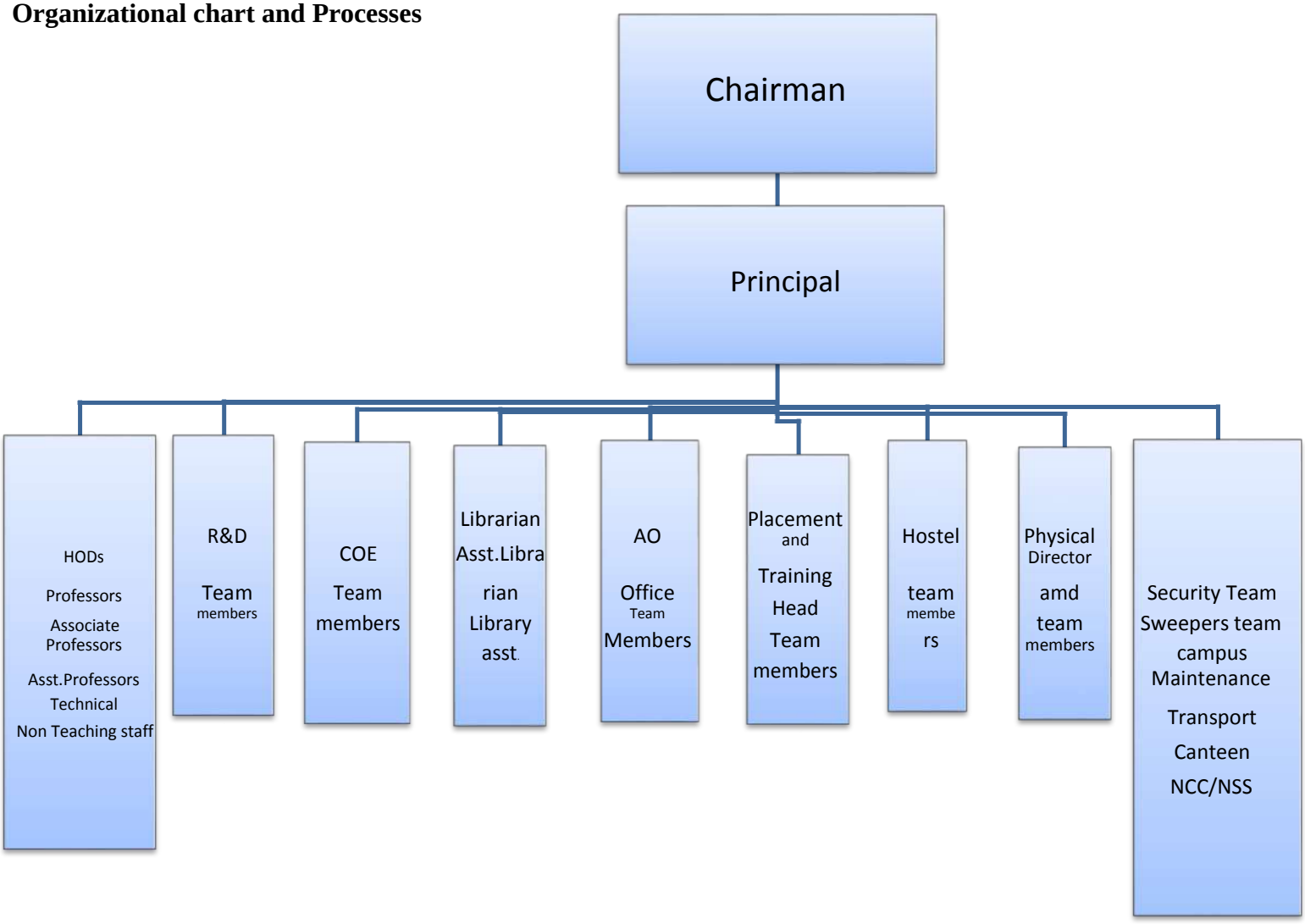
S.No.	Committee type	Name	Address	Profession	Associated with	Email id	Mobile No.
1	OMBUDSMAN	Dr.A.Sethurathnam	20, Maheswari Nagar, 1st street, Thanneerpandal, peelamedu, Coimbatore - 641004	Retired Professor	Academic	sethunathnam@rediffmail.com	4212332244
2	Grievance Redressal	The Director	Anna University, Chennai - 25	Academic	Academic	registrar@annauniv.edu	4422351956

Establishment of committee for SC/ST

SC/ST Committee with the following members is constituted for the academic year 2021 – 2022. All the committee members are hereby requested to adhere to the norms of AICTE, State / Central Government rules and rulings of various courts of law of our country.

S.No	Name of the Committee Member	Designation
1	Dr. M.Karthikeyan	Principal - Chairman
2	Mrs.T.Arachelvi	Asso.Prof.- Member Secretary
3	Mrs.G.Sathya	Asst.Prof.- Member
4	Mr.S.V.Senthilkumar	Jr.Asst.- Member
5	Mr.K.Rangasamy	Marker- Member

Organizational chart and Processes



6. Programmes

NBA Accreditation Status		
1	Name/List of Programmes/Courses Accredited	NIL
2	Applied for Accreditation	NIL
	A.Applied but visit not happened	NIL
	B. Visit happened but result awaited	NIL
3	List of programmes/courses not Applied	UG: 1. B.E Automobile Engineering 2. B.E Civil Engineering 3. B.E Computer science and Engineering 4. B.E Electrical and Electronics Engineering 5. B.E Electronics and Communication Engineering 6. B.E Instrumentation and Control System Engineering 7. B.E Mechanical Engineering PG: 1. M.E Structural Engineering 2. M.E Computer science and Engineering

NAAC Accreditation Status		
1	Accredited	NIL
2	Applied for Accreditation	NIL
	A.Applied but Visit not happened	NIL
	B. Visit happened but result awaited	NIL
3	Not Applied	UG: 1. B.E Automobile Engineering 2. B.E Civil Engineering 3. B.E Computer science and Engineering 4. B.E Electrical and Electronics Engineering 5. B.E Electronics and Communication Engineering 6. B.E Instrumentation and Control System Engineering 7. B.E Mechanical Engineering PG: 1. M.E Structural Engineering 2. M.E Computer science and Engineering

Name of Programmes Approved By AICTE	Name of Programmes Accredited by NBA	Status of Accreditation of the Courses		
		Total number of Courses	No.of Courses for which applied for Accreditation	Status of Accreditation– Preliminary/ Applied for SAR and results awaited/ Applied for SAR and visits completed/ Results of the visits awaited/ Rejected/ Approved for ….Courses (specify the number of courses)
Engineering & Technology	---	---	---	---
MBA	---	---	---	---

For each Programme the following details are to be given (Preferably in Tabular form):

Name of Programmes	Number of seats	Duration	Cut off marks/rank of admission during the last three years	Fee (as approved by the state government)	Placement Facilities	Campus placement in last three years with minimum salary ,maximum salary and average salary
UG- B.E						
Automobile Engineering	30	4 Yrs.		**GQ- Rs.50,000/- Per Year** **MQ.Rs. 85,000/- Per Year**	**Placement Count 2020:5 2021:6 2022:10** **Facilities Provided: 1.Personality development programs 2.Coomunictaion development**	**2020: 1.2 -2 L P A 2021: 1.2 -2 L P A 2022: 1.2 -2 L P A**

					programs 3.Softskills Training 4.Guest Lectures from Corporate 5.Regular Aptitude training 6. Group Discussion 7. Mock Interview 8.Value added courses	
Civil Engineering	30	4 Yrs.			**2020:2 2021:4 2022:12 Facilities Provided: 1.Personality development programs 2.Coomunictaion development programs 3.Softskills Training 4.Guest Lectures from Corporate 5.Regular Aptitude training Group Discussion Mock Interview Value added courses**	**2020: 1.2 -2 L P A 2021: 1.2 -2 L P A 2022: 1.2 -2 L P A**
Computer Science and Engineering	60	4 Yrs.			**2020:13 2021:8 2022:22 Facilities Provided: 1.Personality development programs 2.Coomunictaion development programs 3.Softskills Training 4.Guest Lectures**	**2020: 1.2 -10 L P A 2021: 1.2 -10 L P A 2022:1.2-3.5 L P A**

					from Corporate 5.Regular Aptitude training 6. Group Discussion 7. Mock Interview 8.Value added courses	
Electrical and Electronics Engineering.	30	4 Yrs.			**2020:13 2021:8 2022:5 Facilities Provided: 1.Personality development programs 2.Coomunictaion development programs 3.Softskills Training 4.Guest Lectures from Corporate 5.Regular Aptitude training 6. Group Discussion 7. Mock Interview 8.Value added courses**	**2020: 1.2 -10 L P A 2021: 1.2 -10 L P A 2022:1.2-2 L P A**
Electronics and Communicatio n Engineering	60	4 Yrs.			**2020:26 2021:23 2022:20 Facilities Provided: 1.Personality development programs 2.Coomunictaion development programs 3.Softskills Training 4.Guest Lectures from Corporate 5.Regular Aptitude training 6. Group**	**2020: 1.2 -10 L P A 2021: 1.2 -10 L P A 2022: 1.2 -3.5 L P A**

					Discussion **7. Mock Interview**	
					8.Value added courses	
Instrumentation and Control Engineering	30	4 Yrs.			**2019:1** **2021:1** **2022:3** **Facilities Provided:** **1.Personality development programs** **2.Coomunictaion development programs** **3.Softskills Training** **4.Guest Lectures from Corporate** **5.Regular Aptitude training** **6. Group Discussion** **7. Mock Interview** **8.Value added courses**	**2019: 1.2 -2L P A** **2021: 1.2 -10 L P A** **2022: 1.2 -2 L P A**
Mechanical Engineeirng	60	4 Yrs.			**2020:11** **2021:29** **2022:20** **Facilities Provided:** **1.Personality development programs** **2.Coomunictaion development programs** **3.Softskills Training** **4.Guest Lectures from Corporate** **5.Regular Aptitude training** **6. Group Discussion** **7. Mock Interview** **8.Value added courses**	**2020: 1.2 -2L P A** **2021: 1.2 -2 L P A** **2022: 1.2 -2 L P A**
TOTAL	300					

Name and duration of Programme(s) having Twinning and Collaboration with Foreign

University(s) and being run in the same Campus along with status of their AICTE approval. If there is Foreign Collaboration, give the following details:

Details of the Foreign University

Name of the University

Address

Website

Accreditation status of the University in its Home Country

Ranking of the University in the Home Country

Whether the degree offered is equivalent to an Indian Degree? If yes, the name of the agency which has approved equivalence. If no, implications for students in terms of pursuit of higher studies in India and abroad and job both within and outside the country

Nature of Collaboration

Conditions of Collaboration

Complete details of payment a student has to make to get the full benefit of Collaboration - -NO--

- For each Programme Collaborated provide the following:

Programme Focus

Number of seats

Admission Procedure

Fee (as approved by the state government)

Placement Facility

Placement Records for last three years with minimum salary, maximum salary and average salary

- Whether the Collaboration Programme is approved by AICTE? If not whether the Domestic/ Foreign University has applied to AICTE for approval

-No-

Tamilnadu College of Engineering					
Staff Joined and Relieved - three years					
S.No	Name of the Faculty	Department	Joining Date	Relieving date	Month
1.	NADARAJ. V	S&H	25-06-2008	12-01-2019	Jan-19
2.	SIVAMALAR. S	S&H	20-08-2008	12-01-2019	Jan-19
3.	POOVIZICHELVI. M	CIVIL	14-10-2014	29-03-2019	Mar-19
4.	SAKTHIVEL. T. K	MECH	23-08-2017	21-03-2019	Mar-19
5.	JUBIN JOSE	MECH	25-06-2018	29-03-2019	Mar-19
6.	ANUSH KANNAN. N. K	ECE	04-10-2006	03-04-2019	Apr-19
7.	SOWMIYA. J	ECE	15-02-2018	30-04-2019	Apr-19
8.	ELAVARASAN. S	ICE	08-07-2013	30-04-2019	Apr-19
9.	SHENBAGAVALLI. R	CSE	12-03-2008	30-04-2019	Apr-19
10.	SAMPATHKUMAR. K	AUTO	07-08-2002	30-04-2019	Apr-19
11.	JAYALAKSHMI. S	AUTO	10-03-2016	29-03-2019	Apr-19
12.	LOKESHWARI. M	S&H	01-03-2013	30-04-2019	Apr-19
13.	VIGNESH. L	S&H	02-06-2018	30-04-2019	Apr-19
14.	SHAMUGAPRIYA. E	S&H	25-06-2018	30-04-2019	Apr-19
15.	DEEPA. C	S&H	25-01-2019	30-04-2019	Apr-19
16.	SUBATHRA. R	CIVIL	29-12-2014	22-04-2019	May-19
17.	NARMATHA. M	CIVIL	01-06-2016	22-04-2019	May-19
18.	ANBUMEENA. S	CIVIL	27-12-2017	22-04-2019	May-19
19.	ARUN. J	ECE	09-09-2008	22-04-2019	May-19
20.	THIRUVENGADAM. R	ECE	01-06-2009	22-04-2019	May-19
21.	MURUGAN. K	ECE	05-07-2010	31-05-2019	May-19
22.	DURAIRAJ. S	ICE	07-01-2016	31-05-2019	May-19
23.	SATHYA. N	CSE	27-06-2011	22-04-2019	May-19
24.	KOKILA. R	CSE	18-06-2012	22-04-2019	May-19
25.	SANGEETHA. P	CSE	20-06-2016	22-04-2019	May-19
26.	SENTHILKUMAR. K	EEE	01-07-2009	22-04-2019	May-19
27.	INDHUMATHI. P	S&H	17-02-2011	22-04-2019	May-19
28.	SUPRIYA. D	S&H	03-01-2018	31-05-2019	May-19
29.	BOOMA. C	S&H	25-06-2018	22-04-2019	May-19
30.	SHERLIN SIBITHA. G. A	CIVIL	02-07-2019		Jul-19
31.	RAJASHREE. A.S	CIVIL	02-07-2019		Jul-19
32.	PRIYADHARSHINI. S	ECE	04-07-2019		Jul-19
33.	SAKTHIVEL. P	EEE	05-07-2019		Jul-19
34.	SARAVANAN. K	S&H	01-07-2019		Jul-19
35.	SIVARANJANI. R	CSE	02-08-2019		Aug-19
36.	KAVITHA. B	S&H	29-07-2019		Aug-19
37.	NAVEENKUMAR. D	ICE	06-07-2016	28-03-2019	Sep-19
38.	POONKOTHAI. M	S&H	30-10-2019		Oct-19
39.	ELAVARASAN. G	CIVIL	28-12-2018	19-11-2019	Nov-19
40.	AMIRTHAVALLI. R	S&H	25-01-2019	23-10-2019	Nov-19
41.	JEEVITHA.K	EEE	15-07-2019	03-12-2019	Dec-19
42.	KEERTHANA. R	CIVIL	02-01-2020		Jan-20

43.	THULASIRAJAN. S. D	CIVIL	10-01-2020		Jan-20
44.	BALAJI. K	CIVIL	10-01-2020		Jan-20
45.	DURAIMURUGAN. P	MECH	10-01-2020		Jan-20
46.	SATHEESHKUMAR. T. T	MECH	10-01-2020		Jan-20
47.	RAMAKRISHNAN. S	MECH	10-01-2020		Jan-20
48.	ELAVARASAN. P	MECH	10-01-2020		Jan-20
49.	RAJ MOHAN. R	MECH	10-01-2020		Jan-20
50.	RAMKUMAR. R	MECH	10-01-2020		Jan-20
51.	SANTHOSH KUMAR. P	MECH	10-01-2020		Jan-20
52.	SUNDAR RASU. C	ECE	10-01-2020		Jan-20
53.	DARTHY RABECKA. V	ECE	10-01-2020		Jan-20
54.	LALITHA. V	ECE	10-01-2020		Jan-20
55.	THANGAVEL. V	ECE	10-01-2020		Jan-20
56.	LOKESH. S	ECE	10-01-2020		Jan-20
57.	THIRUVENGADAM. R	ECE	10-01-2020		Jan-20
58.	KANIMOZHI. V	ECE	10-01-2020		Jan-20
59.	SUBADHARANI. S	ECE	10-01-2020		Jan-20
60.	RAMESH KUMAR. N	ICE	10-01-2020		Jan-20
61.	SRI SARANYA.S	ICE	10-01-2020		Jan-20
62.	SUMITHRA. C	ICE	10-01-2020		Jan-20
63.	ARUN KUMAR. V	CSE	10-01-2020		Jan-20
64.	GUNALAN. K	CSE	10-01-2020	04-01-2021	Jan-20
65.	GIRIJA. P	CSE	10-01-2020		Jan-20
66.	KOKILA. R	CSE	10-01-2020		Jan-20
67.	SATHISHKUMAR. C	CSE	10-01-2020		Jan-20
68.	DIVYA. P	CSE	10-01-2020		Jan-20
69.	MAGESHKUMAR. B	CSE	10-01-2020		Jan-20
70.	SATHYA. N	CSE	10-01-2020		Jan-20
71.	KOKILA. G	CSE	10-01-2020		Jan-20
72.	BRINDHA. R	S&H	02-01-2020		Jan-20
73.	RAJ THILAK. T	S&H	02-01-2020		Jan-20
74.	SARASWATHI. E	S&H	02-01-2020		Jan-20
	GANESH. A	MECH	06-08-2015	20-02-2020	Feb-20
	MAYILSAMY. A	ICE	01-12-2020		Dec-20
	HEMALATHA. M	CIVIL	18-12-2018	30-11-2020	Dec-20
	POORNIMARANI. S	ICE	10-01-2020	27-08-2020	Dec-20
	AARTHI. B	CIVIL	03-09-2019	11-01-2021	Jan-21
	GOPALAKRISHNAN. S		04-02-2021		Feb-21
	JEGAN DIVIRAVIANATH.S	ICE	10-02-2008	22-02-2021	Feb-21
	PRABHU. T	CSE	24-09-2008	31-08-2020	Feb-21
	PONPRASANNA T	CSE	10-01-2020	24-12-2020	Feb-21
	KARTHI A	S&H	22-12-2017	27-02-2021	Feb-21

	M. FAKKIR MOHAMMED	**AUTO**	**25.06.2018**	6-04-2021	**APR-21**
	R.SELVARAJ	**CSE**	**03.05.2011**	10-06-2021	**JUN-21**
	M.SETHUPATHI	**MBA**	**07.01.2015**	25-06-2021	**JUN-21**
	P.GIRIJA	**CSE**	**02.01.2020**	01-07-2021	**JUL-21**
	K.KRISHNESWARI	**CSE**	**12.12.2004**	05-08-2021	**AUG-21**
	T.SATHEESH	**CSE**	**18.06.2012**	15-09-2021	**SEP-21**
	N.KRISHNAVENI	**MBA**	**19.09.2018**	23-09-2021	**SEP-21**
	M.KARUPPUSAMY	**CIVIL**		04-10-2021	**OCT-21**
	E.SARASWATHI	**S&H**	**02.01.2020**	18-10-2021	**OCT-21**
	J.VARUNA	**S&H**		16-11-2021	**NOV-21**
	R.SHENBAGAVALLI	**CSE**	**14.09.2021**	30-12-2021	**DEC-21**
	S.YAKNESH	**AUTO**	**28.06.2017**	30-12-2021	**DEC-21**
	M.POONKOTHAI	**S&H**	**30.10.2019**	03-12-2021	**DEC-21**
	T.THIRUNAMAKKANI	**S&H**	**28.04.2021**	07-02-2022	**FEB-22**
	S.NAGAMMAI	**ECE**		01-02-2022	**FEB-22**
	S.GOPALA KRISHNAN	**CIVIL**	**04.02.2021**		**FEB-21**
	P.S.VINOTH KUMAR	**PHYSICAL DIRECTOR**	**24.03.2021**		**MAR-21**
	P.SELVAN	**AUTO**	**07.04.2021**		**APR-21**
	R.GANESH	**CSE**	**01.10.2021**		**OCT-21**
	T.RAMYA	**CSE**	**01.11.2021**		**NOV-21**
	R.BRUNDHA	**S&H**	**27.10.2021**		**OCT-21**
	S.CAPTAIN PRAPAHARAN	**S&H**	**10.11.2021**		**NOV-21**
	G.A.JESLIN RENISHA	**S&H**	**17.11.2021**		**NOV-21**
	S.BANUMATHI	**MBA**	**26.10.2021**		**OCT-21**
	R.SANTHOSH	**MBA**	**17.11.2021**		**NOV-21**
	S.SENTHAMIL SELVAN	**S&H**	**23.12.2021**		**DEC-21**

Anna University, Chennai
Tamilnadu College of Engineering - 7142

Consolidated_Report

13.faculty

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	COMPUTER SCIENCE AND ENGINEEERING
Name of the Degree & Course	M.E.-COMPUTER SCIENCE AND ENGINEERING
Name of the faculty member	DR. KARTHIKEYAN M
Regular Or Adjunct	Regular
Image	
Present Designation	PRINCIPAL
Residential Address Line 1	NO. 50, 3RD STREET, SHAKTHI NAGAR, KAVUNDAMPALAYAM
Line 2	COIMBATORE - 641030.
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9715564222
Email	KARTHIKN_M@HOTMAIL.COM
Gender	MALE
Community	BC
PAN Number	AFVPK0579E
Passport Number	
Aadhar Number	962911592531
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	433853461
Date of Birth	04-06-1969
Age	52
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	1990	KONGU ENGINEERING COLLEGE (AUTONOMOUS)	BHARATHIYAR UNIVERSITY	69	FIRST CLASS	
P.G.	M.TECH.	OTHERS - COMPUTER AND INFORMATION TECHNOLOGY	2005	OTHERS - CENTRE FOR IT AND ENGINEERING	MANOMANIAM SUNDARNAR UNIVERSITY	78.3	DISTINCTION	
PH.D.	PH.D.	OTHERS - COMPUTER AND INFORMATION TECHNOLOGY	2010	OTHERS - CENTRE FOR IT AND ENGINEERING	MANOMANIAM SUNDARNAR UNIVERSITY	Y		

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION
Score :
File :

II. Title of Ph.D. Thesis	DEVELOPMENT OF PREDICTIVE DATA MINING ARCHITECTURE
III. Faculty in which Ph.D. was awarded	OTHERS
IV. Academic Experience : **(Start from the Current working Experience) ***	

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	PROFESSOR	30-11-2007	27-01-2021	13	1	28
ADHIYAMAAN COLLEGE OF ENGINEERING (AUTONOMOUS)	OTHERS - LECTURER	24-04-1991	25-07-1992	1	3	2
AL-AMEEN ENGINEERING COLLEGE (AUTONOMOUS)	OTHERS - LECTURER	22-08-1990	23-04-1991	0	8	2
HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY(AUTONOMOUS)	ASSISTANT PROFESSOR	16-08-2001	08-09-2006	5	0	24
SRI SHAKTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)	ASSISTANT PROFESSOR	11-09-2006	29-11-2007	1	2	19
			Total	21	4	17

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
FACT CENTRE PONDICHERRY	PROJECT LEADER	PROJECT LEADER	13-12-1995	14-08-2001	5	8	2
RA AUTOMATION MADRAS	PROGRAMMER	PROGRAMMER	09-04-1992	12-11-1995	3	3	8
				Total	8	11	14

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the Degree & Course	B.E.-ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the faculty member	DR. SARAVANAKUMAR G
Regular Or Adjunct	Regular
Image	
Present Designation	PROFESSOR
Residential Address Line 1	4/120A, KRISHNA NAGAR, BETHANAYAKKAAN PALAYAM,KALLIPALAYAM
Line 2	COIMBATORE-641107.
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 8903827798
Email	SARAVANAKUMAR579@YAHOO.COM
Gender	MALE
Community	BC
PAN Number	BGDPS5967C
Passport Number	L4019908
Aadhar Number	929362158451
Faculty code given by C.O.E.	7142011
Faculty code given by A.I.C.T.E.	452234351
Date of Birth	30-06-1973
Age	48

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of The University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRICAL AND ELECTRONICS ENGINEERING	1994	MEPCO SCHLENK ENGINEERING COLLEGE (AUTONOMOUS)	MADURAI KAMARAJ UNIVERSITY	58	SECOND CLASS	
P.G.	M.E.	OTHERS - PROCESS CONTROL AND INSTRUMENTATION	2002	OTHERS - ANNAMALAI UNIVERSITY	ANNAMALAI UNIVERSITY	8.42	DISTINCTION	
PH.D.	PH.D.	INSTRUMENTATION AND CONTROL ENGINEERING	2008	OTHERS - ANNA UNIVERSITY CHENNAI	ANNA UNIVERSITY	Y		

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION
Score :
File :

II. Title of Ph.D. Thesis	DESIGN AND ANALYSIS OF MODIFIED SMITH PREDICTORS FOR PROCESS WITH INTEGRATOR AND LONGER DEAD TIMING USING ADAPTIVE TUNING
III. Faculty in which Ph.D. was awarded	FACULTY OF ELECTRICAL ENGINEERING
IV. Academic Experience : **(Start from the Current working Experience) ***	

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
MAHENDRA ENGINEERING COLLEGE (AUTONOMOUS)	OTHERS - LECTURER	20-07-1998	13-11-2002	4	3	25
OTHERS - BITS PILANI UNIVERSITY DUBAI UAE	ASSISTANT PROFESSOR	16-08-2009	16-01-2011	1	5	1
MAHENDRA ENGINEERING COLLEGE (AUTONOMOUS)	OTHERS - SENIOR LECTURER	14-11-2002	08-04-2005	2	4	25
OTHERS - MANIPAL UNIVERSITY	OTHERS - SENIOR LECTURER	13-10-2005	25-07-2009	3	9	13
TAMILNADU COLLEGE OF ENGINEERING	PROFESSOR	02-02-2011	29-01-2021	9	11	26
SASURIE COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-06-2005	12-10-2005	0	4	12
			Total	22	3	15

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
ELCOT POWER CONTROL LIMITED	JUNIOR EXECUTIVE ENGINEER	QUALITY CONTROL	12-06-1995	29-05-1997	1	11	18
LCOT POWER CONTROL LIMITED MADRAS	JUNIOR MANAGEMENT CADRE GRADE IV	QUALITY CONTROL	01-06-1997	20-05-1998	0	11	20
				Total	2	11	12

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the Degree & Course	B.E.-ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the faculty member	DR. SIVAKUMAR R
Regular Or Adjunct	Regular
Image	
Present Designation	PROFESSOR
Residential Address Line 1	91A,DURAISAMY NAIDU LAYOUT ,PEELAMEDU
Line 2	COIMBATORE
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9345799075
Email	RSKSIVAME@GMAIL.COM
Gender	MALE
Community	OC
PAN Number	BACPS4187D
Passport Number	
Aadhar Number	614589438895
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	452614131
Date of Birth	28-04-1976
Age	45
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	1997	MEPCO SCHLENK ENGINEERING COLLEGE (AUTONOMOUS)	MADURAI KAMARAJ UNIVERSITY	71	FIRST CLASS	
P.G.	M.E.	COMPUTER SCIENCE AND ENGINEERING	2000	GOVERNMENT COLLEGE OF TECHNOLOGY COIMBATORE (AUTONOMOUS)	MANOMANIAM SUNDARNAR UNIVERSITY	71	FIRST CLASS	
PH.D.	PH.D.	COMPUTER SCIENCE AND ENGINEERING	2013	OTHERS - BHARATHIAR UNIVERSITY	BHARATHIYAR UNIVERSITY	Y		

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

A NEW IMPLEMENTATION OF ARTIFICIAL BEE COLONY SYSTEM FOR DETECTION OF MICROCALCIFICATION IN DIGITAL MAMMOGRAM

III. Faculty in which Ph.D. was awarded

OTHERS

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
PSNA COLLEGE OF ENGINEERING AND TECHNOLOGY	OTHERS - LECTURER	18-01-2001	16-07-2002	1	5	30
R. V. S COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	17-07-2002	05-01-2006	3	5	20
R. V. S COLLEGE OF ENGINEERING	OTHERS - LECTURER	17-06-2000	17-01-2001	0	7	1
R. V. S COLLEGE OF ENGINEERING	OTHERS - LECTURER	06-05-1998	01-05-1999	0	7	1
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	04-05-2007	31-08-2013	6	3	28
TAMILNADU COLLEGE OF ENGINEERING	PROFESSOR	01-09-2013	29-01-2021	7	4	29
HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY(AUTONOMOUS)	ASSISTANT PROFESSOR	01-06-2006	05-03-2007	1	3	29
			Total	21	2	20

V. Industrial Experience :

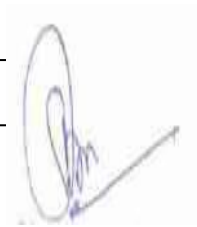
Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.



Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	CIVIL ENGINEERING
Name of the Degree & Course	B.E.-CIVIL ENGINEERING
Name of the faculty member	DR. KAVIMANI V
Regular Or Adjunct	Regular
Image	
Present Designation	PROFESSOR
Residential Address Line 1	16, RAMASAMY NAGAR, MYLAMPATTI PO,
Line 2	COIMBATORE - 641062
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9944476725
Email	KAVIMANTCE@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	AJBPK3879P
Passport Number	
Aadhar Number	908274403222
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	431236333
Date of Birth	12-06-1965
Age	56
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.SC.	OTHERS - GEOLOGY	1985	OTHERS - NATIONAL COLLEGE TRICHY	BHARATHIDASAN UNIVERSITY	82	FIRST CLASS	
P.G.	M.SC.	OTHERS - APPLIED GEOLOGY	1987	OTHERS - NATIONAL COLLEGE TRICHY	BHARATHIDASAN UNIVERSITY	83	FIRST CLASS	
PH.D.	PH.D.	OTHERS - HYDRO GEOLOGY	2013	OTHERS - NATIONAL COLLEGE TRICHY	BHARATHIDASAN UNIVERSITY	AWARDED		

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis	INTEGRATED GROUND WATER STUDY OF NOYYIL RIVER BASIN TAMILNADU INDIA
III. Faculty in which Ph.D. was awarded	OTHERS
IV. Academic Experience :	
(Start from the Current working Experience) *	

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	22-01-1990	30-06-2003	13	5	10
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-12-2005	31-07-2011	5	7	31
TAMILNADU COLLEGE OF ENGINEERING	ASSOCIATE PROFESSOR	01-08-2011	31-05-2013	1	9	31
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - SENIOR LECTURER	01-07-2003	30-11-2005	2	4	31
TAMILNADU COLLEGE OF ENGINEERING	PROFESSOR	01-06-2013	04-02-2021	7	8	4
			Total	31	0	18

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	SCIENCE AND HUMANITIES
Name of the Degree & Course	S&H-MATHEMATICS
Name of the faculty member	DR. SIVAMANI N
Regular Or Adjunct	Regular
Image	
Present Designation	PROFESSOR
Residential Address Line 1	4/674, MURUGAN NAGAR, KARANAMPETTAI PODT
Line 2	PALLADAM,641401
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9865258118
Email	SIVAMANITCE@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	CFJPS9173Q
Passport Number	
Aadhar Number	863317734039
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	435758551
Date of Birth	31-10-1977
Age	44
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.SC.	OTHERS - MATHEMATICS	1998	OTHERS - LRG COLLEGE OF ARTS AND SCIENCE	BHARATHIYAR UNIVERSITY	63	FIRST CLASS	
P.G.	OTHERS - M.PHIL	OTHERS - FUNCTIONAL ANALYSIS	2002	OTHERS - PSG COLLEGE OF ARTS AND SCIENCE	BHARATHIYAR UNIVERSITY	75.6	FIRST CLASS	
P.G.	M.SC.	OTHERS - MATHEMATICS	2000	OTHERS - NGM CLLEGE OF ARTS AND SCIENCE	BHARATHIYAR UNIVERSITY	72.5	FIRST CLASS	
PH.D.	PH.D.	MATHEMATICS	2014	OTHERS - GOVERNMENT ARTS COLLEGE	BHARATHIYAR UNIVERSITY	Y		

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis	NEW CLASSES OPERATORS ON DIFFERENT HILBERT SPACES
III. Faculty in which Ph.D. was awarded	FACULTY OF SCIENCE AND HUMANITIES
IV. Academic Experience : **(Start from the Current working Experience) ***	

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSOCIATE PROFESSOR	24-01-2018	01-01-2020	1	11	9
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	13-08-2002	31-05-2011	8	9	19
TAMILNADU COLLEGE OF ENGINEERING	PROFESSOR	02-01-2020	05-02-2021	1	1	4
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-07-2014	23-01-2018	3	6	23
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - SENIOR LECTURER	01-06-2011	30-06-2014	3	0	30
			Total	18	5	28

V. Industrial Experience :

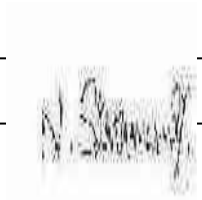
Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
5	2			

It is certified that all the information provided are true to the best of my knowledge.



Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	COMPUTER SCIENCE AND ENGINEEERING
Name of the Degree & Course	M.E.-COMPUTER SCIENCE AND ENGINEERING
Name of the faculty member	DR. LATHA SHANMUGAVADIVU S
Regular Or Adjunct	Regular
Image	
Present Designation	PROFESSOR
Residential Address Line 1	112-C, SHANMUGA NIVAS,V.K.ROAD,THANEER PANDAL,PEELAMEDU
Line 2	COIMBATORE-641004
District	COIMBATORE
Telephone number	0422 - 2512799
Mobile number	+91 - 9843520777
Email	LATHA@TNCE.IN
Gender	FEMALE
Community	BC
PAN Number	AVTPS8621B
Passport Number	H1361771
Aadhar Number	641442108331
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	429532750
Date of Birth	22-04-1974
Age	47
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	1995	KUMARAGURU COLLEGE OF TECHNOLOGY (AUTONOMOUS)	BHARATHIYAR UNIVERSITY	65	FIRST CLASS	
P.G.	OTHERS - M.S BY RESEARCH	OTHERS - COMPUTER SCIENCE AND ENGINEERING	2007	GOVERNMENT COLLEGE OF TECHNOLOGY COIMBATORE (AUTONOMOUS)	ANNA UNIVERSITY	Y	OTHERS - AWARDED	
PH.D.	PH.D.	COMPUTER SCIENCE AND ENGINEERING	2012	GOVERNMENT COLLEGE OF TECHNOLOGY COIMBATORE (AUTONOMOUS)	ANNA UNIVERSITY	Y		

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis	OPTIMIZED SEMANTIC BASED MULTIPLE WEB SEARCH ENGINE WITH ANTI PHISHING TECHNIQUE
III. Faculty in which Ph.D. was awarded	FACULTY OF INFORMATION AND COMMUNICATION ENGINEERING
IV. Academic Experience : **(Start from the Current working Experience) ***	

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	PROFESSOR	30-05-2012	25-01-2021	8	7	27
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - ASSOCIATE LECTURER	17-07-1995	05-01-1996	0	5	20
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	07-01-2008	31-07-2011	3	6	25
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	06-01-1996	01-06-2003	7	4	27
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - SENIOR LECTURER	02-06-2003	06-01-2008	4	7	5
TAMILNADU COLLEGE OF ENGINEERING	ASSOCIATE PROFESSOR	01-08-2011	29-05-2012	0	9	29
			Total	25	6	17

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
	5			

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	COMPUTER SCIENCE AND ENGINEEERING
Name of the Degree & Course	B.E.-COMPUTER SCIENCE AND ENGINEERING
Name of the faculty member	DR. SHANTHI A S
Regular Or Adjunct	Regular
Image	
Present Designation	PROFESSOR
Residential Address Line 1	6/66,VIP STREET, NAMBIYAMPALAYAM
Line 2	AVINASI - 641670
District	TIRUPPUR
Telephone number	04296 - 288610
Mobile number	+91 - 9942288733
Email	BABUSHANTHI@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	BCBPS2789C
Passport Number	GO845361
Aadhar Number	576212023331
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	435846049
Date of Birth	06-03-1978
Age	43
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	COMPUTER SCIENCE AND ENGINEERING	2000	SRI RAMAKRISHNA ENGINEERING COLLEGE (AUTONOMOUS)	BHARATHIYAR UNIVERSITY	65	FIRST CLASS	
P.G.	M.E.	SOFTWARE ENGINEERING	2006	SRI RAMAKRISHNA ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	75	FIRST CLASS	
PH.D.	PH.D.	COMPUTER SCIENCE AND ENGINEERING	2017	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	YES		

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis	CERTAIN IMPROVEMENTS IN MRI BRAIN IMAGE CLASSIFICATION USING OPTIMIZATION TECHNIQUES
III. Faculty in which Ph.D. was awarded	FACULTY OF INFORMATION AND COMMUNICATION ENGINEERING
IV. Academic Experience : **(Start from the Current working Experience) ***	

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSOCIATE PROFESSOR	24-01-2018	01-01-2020	1	11	9
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	18-08-2003	30-07-2004	0	11	13
MAHARAJA ENGINEERING COLLEGE	OTHERS - LECTURER	13-11-2001	14-08-2003	1	9	2
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	09-05-2007	31-05-2011	4	0	23
SRI KRISHNA COLLEGE OF TECHNOLOGY (AUTONOMOUS)	OTHERS - LECTURER	06-12-2000	12-11-2001	0	11	7
TAMILNADU COLLEGE OF ENGINEERING	PROFESSOR	02-01-2020	25-01-2021	1	0	24
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-08-2011	23-01-2018	6	5	23
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - SENIOR LECTURER	01-06-2011	31-07-2011	0	1	30
			Total	17	4	15

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the Degree & Course	B.E.-ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the faculty member	MRS. ARACHELVI T
Regular Or Adjunct	Regular
Image	
Present Designation	ASSOCIATE PROFESSOR
Residential Address Line 1	9, SIRUVANI NAGAR, SIRUVANI SCHEME ROAD, VEERAKERALAM
Line 2	COIMBATORE - 641 041
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9942334387
Email	ARACHELVI@GMAIL.COM
Gender	FEMALE
Community	SC
PAN Number	AFAPT4859B
Passport Number	
Aadhar Number	604218097292
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	430170215
Date of Birth	14-07-1967
Age	54
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	1989	ALAGAPPA CHETTIAR GOVERNMENT COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)	MADURAI KAMARAJ UNIVERSITY	59	SECOND CLASS	
P.G.	M.TECH.	OTHERS - ADVANCED COMMUNICATION SYSTEMS	2002	OTHERS - SASTRA UNIVERSITY	OTHERS - SASTRA UNIVERSITY	6.8	FIRST CLASS	

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I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSOCIATE PROFESSOR	24-01-2018	29-01-2021	3	0	6
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	05-12-2003	23-01-2018	14	1	19
MAHARAJA ENGINEERING COLLEGE	ASSISTANT PROFESSOR	05-06-2003	04-12-2003	0	5	30
			Total	17	7	28

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
NADI AIRTECHNICS PVT LTD	QUALITY CONTROL ENGINEER	QUALITY CONTROL	05-06-1990	30-12-2000	10	6	25
				Total	10	6	27

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
10				

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	CIVIL ENGINEERING
Name of the Degree & Course	M.E.-STRUCTURAL ENGINEERING
Name of the faculty member	DR. SEETHAPATHI M
Regular Or Adjunct	Regular
Image	
Present Designation	ASSOCIATE PROFESSOR
Residential Address Line 1	KALLIPATTI VILLAGE, DEVEERAHALLI PO, POCHAMPALLI TK,
Line 2	KRISHNAGIRI - 635123
District	KRISHNAGIRI
Telephone number	04341 - 251443
Mobile number	+91 - 9994304379
Email	PATHI_SEETHA@YAHOO.CO.IN
Gender	MALE
Community	MBC
PAN Number	DHFPS1954A
Passport Number	
Aadhar Number	961899132624
Faculty code given by C.O.E.	7142001
Faculty code given by A.I.C.T.E.	429714414
Date of Birth	24-01-1984
Age	37
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	CIVIL ENGINEERING	2006	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	87	DISTINCTION	
P.G.	M.E.	STRUCTURAL ENGINEERING	2008	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	86	FIRST CLASS	
PH.D.	PH.D.	STRUCTURAL ENGINEERING	2017	OTHERS - ANNA UNIVERSITY CHENNAI	ANNA UNIVERSITY	Y		

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis	STUDY ON THE REUSE OF RECYCLED AGGREGATE ECOSAND ON FLY ASH BASED SELF COMPACTING CONCRETE
III. Faculty in which Ph.D. was awarded	FACULTY OF CIVIL ENGINEERING
IV. Academic Experience :	
(Start from the Current working Experience) *	

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	11-02-2008	31-07-2011	3	5	19
TAMILNADU COLLEGE OF ENGINEERING	ASSOCIATE PROFESSOR	02-01-2020	04-02-2021	1	1	3
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-08-2011	31-05-2013	1	9	31
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - ASSISTANT PROFESSOR SS I	01-06-2013	01-01-2020	6	7	1
			Total	12	11	0

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

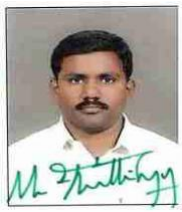
VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
	6			

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MECHANICAL ENGINEERING
Name of the Degree & Course	B.E.-MECHANICAL ENGINEERING
Name of the faculty member	DR. DHARMALINGAM P
Regular Or Adjunct	Regular
Image	
Present Designation	ASSOCIATE PROFESSOR
Residential Address Line 1	28, LAL BAHADUR NAGAR, MKP ROAD, PEELAMEDU PO,
Line 2	COIMBATORE
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9942082725
Email	DHARMALINGA72@GMAIL.COM
Gender	MALE
Community	MBC
PAN Number	AFOPD7377J
Passport Number	
Aadhar Number	381498320817
Faculty code given by C.O.E.	7142107
Faculty code given by A.I.C.T.E.	437243090
Date of Birth	20-07-1971
Age	50

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2005	GOVERNMENT COLLEGE OF TECHNOLOGY COIMBATORE (AUTONOMOUS)	ANNA UNIVERSITY	69	FIRST CLASS	
P.G.	M.E.	INDUSTRIAL ENGINEERING	2011	OTHERS - ANNA UNIVERSITY OF TECHNOLOGY COIMBATORE	OTHERS - ANNA UNIVERSITY OF TECHNOLOGY COIMBATORE	7.89	FIRST CLASS	
PH.D.	PH.D.	MECHANICAL ENGINEERING	2017	KIT - KALAIGNARKARUNANIDHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	Y		

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I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis	A MULTI OBJECTIVE GENETIC ALGORITHM FOR PERMUTATION FLOW SHOP SCHEDULING
III. Faculty in which Ph.D. was awarded	FACULTY OF MECHANICAL ENGINEERING
IV. Academic Experience : **(Start from the Current working Experience) ***	

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSOCIATE PROFESSOR	24-01-2018	29-01-2021	3	0	6
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	03-10-2008	31-08-2011	2	10	29
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-09-2011	23-01-2018	6	4	23
			Total	12	3	0

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
HINDUSTAN UNILEVER LTD COIMBATORE	TECHNICAL SUPERVISOR	MAINTANANCE	24-01-1997	30-09-2008	11	8	8
				Total	11	8	11

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
	2			

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	AUTOMOBILE ENGNEERING
Name of the Degree & Course	B.E.-AUTOMOBILE ENGINEERING
Name of the faculty member	MR. PALANIAPPAN V R
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	9/196, V.S.COMPLEX, EAST CAR STREET,
Line 2	AVINASHI,641654
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9994103214
Email	VPNTCE@GMAIL.COM
Gender	MALE
Community	MBC
PAN Number	CVIPP4488G
Passport Number	
Aadhar Number	276411404368
Faculty code given by C.O.E.	7142179
Faculty code given by A.I.C.T.E.	747244117
Date of Birth	06-05-1983
Age	38
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	AUTOMOBILE ENGINEERING	2010	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	68	FIRST CLASS	
P.G.	M.E.	ENGINEERING DESIGN	2014	ANNA UNIVESITY REGIONAL CAMPUS, COIMBATORE	ANNA UNIVERSITY	68	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	02-05-2011	30-06-2014	3	1	30
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-07-2014	27-01-2021	6	6	27
			Total	9	8	0

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	AUTOMOBILE ENGNEERING
Name of the Degree & Course	B.E.-AUTOMOBILE ENGINEERING
Name of the faculty member	MR. VENKATESH D
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	12, INDIRANAGAR,VARATHARAJAPURAM. UPPILIPALAYAM POST
Line 2	COIMBATORE,641015
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9994055985
Email	VENKATESHUG@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	ASZPV4530H
Passport Number	
Aadhar Number	971262779226
Faculty code given by C.O.E.	7142175
Faculty code given by A.I.C.T.E.	437351774
Date of Birth	13-04-1985
Age	36

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2006	PARK COLLEGE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	69	FIRST CLASS	
P.G.	M.E.	INDUSTRIAL ENGINEERING	2013	ANNA UNIVESITY REGIONAL CAMPUS, COIMBATORE	ANNA UNIVERSITY	87	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	14-08-2013	27-01-2021	7	5	14
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	08-06-2009	13-08-2013	4	2	6
			Total	11	7	23

V. Industrial Experience :

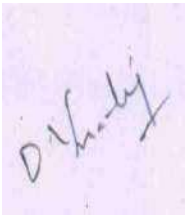
Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	AUTOMOBILE ENGNEERING
Name of the Degree & Course	B.E.-AUTOMOBILE ENGINEERING
Name of the faculty member	MR. SURESHKUMAR D
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	3/63, CHINNAKUMARAPALAYAM, KURICHIKOTTAI POST
Line 2	UDUMALAIPET,642112
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9566670886
Email	SURESHATEASE@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	DNNPS1373F
Passport Number	
Aadhar Number	583021402653
Faculty code given by C.O.E.	7115214
Faculty code given by A.I.C.T.E.	2971916066
Date of Birth	05-03-1990
Age	31
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2011	DR MAHALINGAM COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	8.02 CGPA	FIRST CLASS	
P.G.	M.E.	HEAT POWER ENGINEERING	2013	COIMBATORE INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	8.65 CGPA	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
KIT - KALAIGNARKARUNANIDHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ASSISTANT PROFESSOR	23-06-2014	30-05-2015	0	11	7
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	05-08-2015	27-01-2021	5	5	23
			Total	6	5	3

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
5				

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the Degree & Course	B.E.-ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the faculty member	MR. KANNAN T
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	1/122,SINTHALAPATTI,ODDANCHATRAM,
Line 2	DINDIGUL-624612
District	DINDIGUL
Telephone number	-
Mobile number	+91 - 9952737201
Email	KANNABBRAN@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	BPZPK7920Q
Passport Number	
Aadhar Number	577448584230
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	429742363
Date of Birth	03-05-1987
Age	34

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	2008	CHRISTIAN COLLEGE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	69	FIRST CLASS	
P.G.	M.E.	APPLIED ELECTRONICS	2010	BANNARI AMMAN INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	8.12	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	02-06-2010	29-01-2021	10	7	28
			Total	10	7	1

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
6		3		

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MECHANICAL ENGINEERING
Name of the Degree & Course	B.E.-MECHANICAL ENGINEERING
Name of the faculty member	MR. GOKUL L C
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	232 B,EIRANIAN STREET, SOLAR,
Line 2	ERODE - 638002
District	ERODE
Telephone number	-
Mobile number	+91 - 9600842846
Email	LCGOKUL@GMAIL.COM
Gender	MALE
Community	MBC
PAN Number	AYRPG4137B
Passport Number	
Aadhar Number	670191788197
Faculty code given by C.O.E.	7142162
Faculty code given by A.I.C.T.E.	436275129
Date of Birth	24-11-1983
Age	38
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2009	K S RANGASAMY COLLEGE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	78	FIRST CLASS	
P.G.	M.E.	ENGINEERING DESIGN	2009	KONGU ENGINEERING COLLEGE (AUTONOMOUS)	OTHERS - ANNA UNIVERSITY OF TECHNOLOGY COIMBATORE	8.93	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	11-06-2009	31-07-2011	2	1	20
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-08-2011	29-01-2021	9	5	29
			Total	11	7	22

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
		2		

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MECHANICAL ENGINEERING
Name of the Degree & Course	B.E.-MECHANICAL ENGINEERING
Name of the faculty member	MR. SENTHIL N
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	1/22 A, A. KURUMBALAYAM, CHEYUR PO,
Line 2	AVINASHI - 641655
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9894742728
Email	SENSSRI@GMAIL.COM
Gender	MALE
Community	MBC
PAN Number	CUJPS2334C
Passport Number	
Aadhar Number	344782206368
Faculty code given by C.O.E.	7142156
Faculty code given by A.I.C.T.E.	436928077
Date of Birth	14-09-1984
Age	37
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2007	ERODE SENGUNTHAR ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	70	FIRST CLASS	
P.G.	M.E.	CAD/CAM	2011	R V S COLLEGE OF ENGINEERING AND TECHNOLOGY	OTHERS - ANNA UNIVERSITY OF TECHNOLOGY THIRUCHARAPALLI	7.3	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-06-2012	29-01-2021	8	7	29
			Total	8	7	2

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MECHANICAL ENGINEERING
Name of the Degree & Course	B.E.-MECHANICAL ENGINEERING
Name of the faculty member	MR. GOKULAKRISHNAN S A
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	132, UTHUKULI ROAD, CHENGAPALLI,
Line 2	TIRUPUR - 638812
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9994619309
Email	CITGOKULAKRISHNAN@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	APOPG9985M
Passport Number	HO831334
Aadhar Number	511619243447
Faculty code given by C.O.E.	7142159
Faculty code given by A.I.C.T.E.	1436928297
Date of Birth	10-06-1977
Age	44

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2009	COIMBATORE INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	70	FIRST CLASS	
P.G.	M.E.	ENGINEERING DESIGN	2011	PARK COLLEGE OF ENGINEERING AND TECHNOLOGY	OTHERS - ANNA UNIVERSITY COIMBATORE	8.9	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	19-06-2012	29-01-2021	8	7	11
KATHIR COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	06-01-2011	10-06-2012	1	5	5
			Total	10	0	17

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.
Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the Degree & Course	B.E.-ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the faculty member	MR. DEVASUGAN S M
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	65/163-A,ANNA NAGAR,RANGASAMUDRAM,
Line 2	SATHYAMANGALAM-638402
District	ERODE
Telephone number	-
Mobile number	+91 - 9790490515
Email	DEVASUGANEEE@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	BGZPD0406P
Passport Number	
Aadhar Number	825068263414
Faculty code given by C.O.E.	7142009
Faculty code given by A.I.C.T.E.	436240517
Date of Birth	29-03-1989
Age	32
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRICAL AND ELECTRONICS ENGINEERING	2010	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	78	DISTINCTION	
P.G.	M.E.	POWER SYSTEMS ENGINEERING	2014	OTHERS - KARPAGAM UNIVERSITY	OTHERS - KARPAGAM UNIVERSITY	9.16	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	07-07-2010	30-06-2014	3	11	25
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-07-2014	29-01-2021	6	6	29
			Total	10	6	27

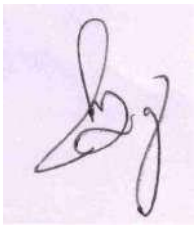
V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
6				

It is certified that all the information provided are true to the best of my knowledge.
Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	INSTRUMENTATION AND CONTROL ENGINEERING
Name of the Degree & Course	B.E.-INSTRUMENTATION AND CONTROL ENGINEERING
Name of the faculty member	MRS. KANAGAVALLI S
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	1/115,SENJERI,SENJERI PO,SULTHANPET VIA,SULUR TK,
Line 2	COIMBATORE-641669.
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9715373763
Email	VISMITAS.SATHISH6@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	DPBPK2875G
Passport Number	
Aadhar Number	995223554783
Faculty code given by C.O.E.	7142034
Faculty code given by A.I.C.T.E.	2187285749
Date of Birth	15-09-1987
Age	34

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	INSTRUMENTATION AND CONTROL ENGINEERING	2009	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	77	FIRST CLASS	
P.G.	M.E.	POWER ELECTRONICS AND DRIVES	2013	OTHERS - KARPAGAM UNIVERSITY	OTHERS - KARPAGAM UNIVERSITY	75	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	28-01-2013	30-06-2013	0	5	4
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-07-2013	25-01-2021	7	6	25
			Total	7	11	4

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
5				

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	COMPUTER SCIENCE AND ENGINEEERING
Name of the Degree & Course	B.E.-COMPUTER SCIENCE AND ENGINEERING
Name of the faculty member	MS. SARANYA V
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	11/14, PERA STREET, PN PALAYAM
Line 2	COIMBATORE-641037
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9944968496
Email	CATCHSARO@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	FYOPS0658K
Passport Number	
Aadhar Number	799780063776
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	437710197
Date of Birth	14-06-1988
Age	33
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	COMPUTER SCIENCE AND ENGINEERING	2010	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	71	FIRST CLASS	
P.G.	M.TECH.	INFORMATION TECHNOLOGY	2013	ANNA UNIVESITY REGIONAL CAMPUS, COIMBATORE	ANNA UNIVERSITY	8.1	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	16-08-2010	12-10-2013	3	1	28
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	13-10-2013	25-01-2021	7	3	13
			Total	10	5	13

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

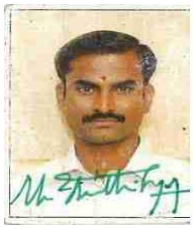
VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
6				

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MECHANICAL ENGINEERING
Name of the Degree & Course	B.E.-MECHANICAL ENGINEERING
Name of the faculty member	MR. RAVICHANDRAN P
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	11 A, SRI NAGAR, SARAVANAMPATTI ROAD, VILANKURICHI,
Line 2	COIMBATORE - 35
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9843805558
Email	NKLRAVI1979@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	ASBPR9441D
Passport Number	
Aadhar Number	550922340250
Faculty code given by C.O.E.	7142196
Faculty code given by A.I.C.T.E.	2390256623
Date of Birth	07-07-1979
Age	42
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2000	K S RANGASAMY COLLEGE OF TECHNOLOGY (AUTONOMOUS)	UNIVERSITY OF MADRAS	65	FIRST CLASS	
P.G.	M.E.	ENGINEERING DESIGN	2014	COIMBATORE INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	7.35	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-07-2014	29-01-2021	6	6	29
			Total	6	6	2

V. Industrial Experience :

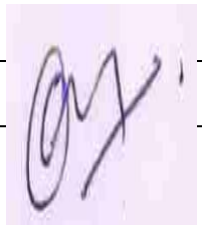
Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
CENTURIY CORPORATION TIRUPUR	SALES AND SERVICE ENGINEER	SERVICING	28-05-2000	06-05-2008	7	11	10
TEXTECH TIRUPUR	SERVICE ENGINEER	SERVICING	09-05-2008	31-01-2010	1	8	23
DYETECH TEXTILE ENGGINDIA P LTD COIMBATORE	PRODUCTION MANAGER	SUPERVISING	05-02-2010	25-05-2012	2	3	21
				Total	11	11	28

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
		2		

It is certified that all the information provided are true to the best of my knowledge.



Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	INSTRUMENTATION AND CONTROL ENGINEERING
Name of the Degree & Course	B.E.-INSTRUMENTATION AND CONTROL ENGINEERING
Name of the faculty member	MRS. SATHYA G
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	3/10,ELAVANTHI POST,
Line 2	TIRUPUR-641667.
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9842860456
Email	SATHYA5488@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	FHMPS9232N
Passport Number	
Aadhar Number	461435195995
Faculty code given by C.O.E.	7142036
Faculty code given by A.I.C.T.E.	2187286424
Date of Birth	05-04-1988
Age	33
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	INSTRUMENTATION AND CONTROL ENGINEERING	2009	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	70	FIRST CLASS	
P.G.	M.E.	POWER ELECTRONICS AND DRIVES	2013	OTHERS - KARPAGAM UNIVERSITY	OTHERS - KARPAGAM UNIVERSITY	79	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	15-02-2013	30-06-2013	0	4	14
P A COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)	OTHERS - LECTURER	07-02-2011	06-05-2011	0	2	28
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-07-2013	25-01-2021	7	6	25
			Total	8	2	8

V. Industrial Experience :

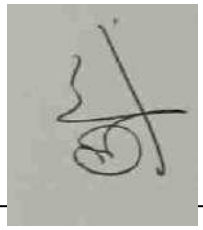
Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
6				

It is certified that all the information provided are true to the best of my knowledge.



Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the Degree & Course	B.E.-ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the faculty member	MR. VIVEK S
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	32, VINAYAGAR KOIL DTREET
Line 2	KRISHNAPURAM SINGANALLUR
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9894333940
Email	EEEVIVEKEEE@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	AUUPV2032K
Passport Number	
Aadhar Number	347226206923
Faculty code given by C.O.E.	7142242
Faculty code given by A.I.C.T.E.	3540418693
Date of Birth	18-03-1990
Age	31
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRICAL AND ELECTRONICS ENGINEERING	2013	ARULMIGU MEENAKSHI AMMAN COLLEGE OF ENGINEERING	ANNA UNIVERSITY	7	FIRST CLASS	
P.G.	M.E.	POWER ELECTRONICS AND DRIVES	2016	PPG INSTITUTE OF TECHNOLOGY	ANNA UNIVERSITY	7.4	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	13-03-2017	29-01-2021	3	10	17
			Total	3	10	22

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.
Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the Degree & Course	B.E.-ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the faculty member	MRS. DIVYA MOHANA PRIYA G
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	4/556,JEEVA NAGAR,KANNU CHETTIAR LINE,
Line 2	UDUMALPET-642126
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9786773776
Email	DIVYAPRIYATCE@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	CIEPD3104L
Passport Number	
Aadhar Number	988075813157
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	435750282
Date of Birth	16-11-1987
Age	34

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	2009	SNS COLLEGE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	85	DISTINCTION	
P.G.	M.E.	VLSI DESIGN	2013	ANNA UNIVESITY REGIONAL CAMPUS, COIMBATORE	ANNA UNIVERSITY	94.8	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	18-09-2009	29-01-2021	11	4	12
			Total	11	4	14

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
11		1		

It is certified that all the information provided are true to the best of my knowledge.
Signature of the Faculty : 

Name of the College		7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department		INSTRUMENTATION AND CONTROL ENGINEERING
Name of the Degree & Course		B.E.-INSTRUMENTATION AND CONTROL ENGINEERING
Name of the faculty member		MRS. MANJULA A
Regular Or Adjunct		Regular
Image		
Present Designation		ASSISTANT PROFESSOR
Residential Address Line 1		81/36 WEST STREET, G.KAVUNDAMPALAYAM,NAICKENPALAYAM PO,
Line 2		COIMBATORE-641020.
District		COIMBATORE
Telephone number		-
Mobile number		+91 - 9786250523
Email		MANJU_INSTRU@YAHOO.CO.IN
Gender		FEMALE
Community		MBC
PAN Number		CGTPM7501D
Passport Number		
Aadhar Number		244471829197
Faculty code given by C.O.E.		7142045
Faculty code given by A.I.C.T.E.		434091246
Date of Birth		29-04-1986
Age		35

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND INSTRUMENTATION ENGINEERING	2007	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	74	FIRST CLASS	
P.G.	M.E.	CONTROL AND INSTRUMENTATION ENGINEERING	2011	ANNA UNIVESITY REGIONAL CAMPUS, COIMBATORE	ANNA UNIVERSITY	8.6	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	~~Relieving Date~~ / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	28-06-2010	25-01-2021	10	6	28
OTHERS - ARULMIGU CHANDIKESHWARAR POLYTECHNIC COLLEGE	OTHERS - LECTURER	17-11-2008	25-06-2010	1	7	9
OTHERS - GOV POLYTECHNIC COLLEGE FOR WOMEN	OTHERS - LECTURER	01-08-2007	13-11-2008	1	3	13
			Total	13	5	23

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	CIVIL ENGINEERING
Name of the Degree & Course	M.E.-STRUCTURAL ENGINEERING
Name of the faculty member	MR. PERIYASAMY L
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	3/116, MURUGAMPALAYAM, UPPILIPALAYAM PO,
Line 2	AVINASHI TK
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9894456077
Email	PERIYASAMY_ER@YAHOO.CO.IN
Gender	MALE
Community	BC
PAN Number	ASCPP7073Q
Passport Number	
Aadhar Number	465510178684
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	1546926605
Date of Birth	27-05-1981
Age	40

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	CIVIL ENGINEERING	2007	COIMBATORE INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	71	FIRST CLASS	
P.G.	M.E.	STRUCTURAL ENGINEERING	2009	COIMBATORE INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	OTHERS - ANNA UNIVERSITY COIMBATORE	89	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	29-06-2012	04-02-2021	8	7	6
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	07-09-2009	11-11-2011	2	4	3
			Total	10	11	14

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
K E C CONSTRUCTION AVINASHI	SITE ENGINEER	SITE VISIT PROJECT EXECUTION	01-06-2003	31-05-2007	3	11	30
M N CONSTRUCTION TIRUPUR	SITE ENGINEER	DRAFTING SITE VISIT	01-06-2000	31-05-2003	2	11	30
				Total	6	11	4

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	COMPUTER SCIENCE AND ENGINEEERING
Name of the Degree & Course	B.E.-COMPUTER SCIENCE AND ENGINEERING
Name of the faculty member	MR. PONNEELA VIGNESH R
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	6/29,MANIKATTIPOTTAL,
Line 2	KANYAKUMARI-629501.
District	KANYAKUMARI
Telephone number	-
Mobile number	+91 - 9976321540
Email	PNVICKY26@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	ASYPV2449L
Passport Number	
Aadhar Number	222699122249
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	2187194928
Date of Birth	05-11-1987
Age	34
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	2009	V R S COLLEGE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	62	FIRST CLASS	
P.G.	M.E.	VLSI DESIGN	2012	SNS COLLEGE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	7.67	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	04-03-2013	25-01-2021	7	10	22
			Total	7	10	27

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
		1		

It is certified that all the information provided are true to the best of my knowledge.
Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the Degree & Course	B.E.-ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the faculty member	MR. RAM KARTHIK KUMAR K
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	20,PONNAGARAM,
Line 2	THOOTHUKUDI-628002
District	THOOTHUKUDI
Telephone number	-
Mobile number	+91 - 9789627321
Email	K.RKKUMAR@YAHOO.IN
Gender	MALE
Community	BC
PAN Number	ATSPR8254L
Passport Number	H6210286
Aadhar Number	868728825729
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	475376691
Date of Birth	10-10-1987
Age	34
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	2009	MOHAMED SATHAK ENGINEERING COLLEGE	ANNA UNIVERSITY	72	FIRST CLASS	
P.G.	M.TECH.	NANO SCIENCE AND TECHNOLOGY	2013	ANNA UNIVESITY REGIONAL CAMPUS, COIMBATORE	ANNA UNIVERSITY	6.57	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score : NIL

File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	08-07-2010	29-01-2021	10	6	22
			Total	10	6	25

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
6		1		

It is certified that all the information provided are true to the best of my knowledge.
Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the Degree & Course	B.E.-ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the faculty member	MR. SUDHAKAR T
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	6/356,V.O.C STREET,NGO COLONY,
Line 2	VIRUDHUNAGAR-626001
District	VIRUDHUNAGAR
Telephone number	04562 - 266463
Mobile number	+91 - 9629424850
Email	HVESUDHAKAR@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	DDTPS4068H
Passport Number	J3344019
Aadhar Number	477829461832
Faculty code given by C.O.E.	7142029
Faculty code given by A.I.C.T.E.	441491918
Date of Birth	02-04-1989
Age	32
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRICAL AND ELECTRONICS ENGINEERING	2010	P S R ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	67	FIRST CLASS	
P.G.	M.E.	HIGH VOLTAGE ENGINEERING	2012	NATIONAL ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	7.25	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	23-07-2012	06-09-2012	0	1	15
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	07-09-2012	29-01-2021	8	4	23
			Total	8	6	10

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
6				

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MECHANICAL ENGINEERING
Name of the Degree & Course	B.E.-MECHANICAL ENGINEERING
Name of the faculty member	MR. ELAVARASAN P
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	12B ALANGAYAM CROSS ROAD, PERUMALPET
Line 2	VANIYAMBADI, 635751
District	VELLORE
Telephone number	-
Mobile number	+91 - 9043544295
Email	PRINCECHARLESS555@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	ABNPE2821R
Passport Number	ABNPE2821R
Aadhar Number	664313382382
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7501231937
Date of Birth	21-12-1991
Age	30

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2013	OXFORD COLLEGE OF ENGINEERING	ANNA UNIVERSITY	66	FIRST CLASS	
P.G.	M.E.	ENGINEERING DESIGN	2015	S K P ENGINEERING COLLEGE	ANNA UNIVERSITY	77	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION
Score :
File :

II. Title of Ph.D. Thesis	
III. Faculty in which Ph.D. was awarded	
IV. Academic Experience : **(Start from the Current working Experience) ***	

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	29-01-2021	1	0	20
			Total	1	0	20

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :
Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MECHANICAL ENGINEERING
Name of the Degree & Course	B.E.-MECHANICAL ENGINEERING
Name of the faculty member	MR. DURAIMURUGAN P
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	127 CG PALAYAM
Line 2	SIVAGIRI, 638109
District	ERODE
Telephone number	-
Mobile number	+91 - 7299957953
Email	DURAI.0106@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	AQEPD8800F
Passport Number	
Aadhar Number	877822410791
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7500532288
Date of Birth	01-06-1986
Age	35
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2008	ANNAI MATHAMMAL SHEELA ENGINEERING COLLEGE	ANNA UNIVERSITY	72	FIRST CLASS	
P.G.	M.E.	CAD/CAM	2012	ANNAI MATHAMMAL SHEELA ENGINEERING COLLEGE	ANNA UNIVERSITY	8.4	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	29-01-2021	1	0	20
			Total	1	0	20

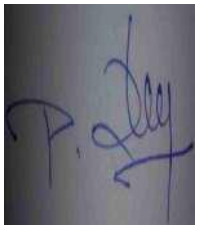
V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.
Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	INSTRUMENTATION AND CONTROL ENGINEERING
Name of the Degree & Course	B.E.-INSTRUMENTATION AND CONTROL ENGINEERING
Name of the faculty member	MRS. SRI SARANYA S
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	3/A KASTHURI NAGAR, MADUKARAI MAIN ROAD, SUNDARAPURAM
Line 2	COIMBATORE, 641204
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9500893239
Email	SRISARANYA6@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	JULPS7280A
Passport Number	
Aadhar Number	839514849982
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7502974290
Date of Birth	06-12-1987
Age	34
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	INSTRUMENTATION AND CONTROL ENGINEERING	2010	TAMILNADU SCHOOL OF ARCHITECTURE	ANNA UNIVERSITY	74	FIRST CLASS	
P.G.	M.E.	APPLIED ELECTRONICS	2013	SNS COLLEGE OF ENGINEERING (AUTONOMOUS)	ANNA UNIVERSITY	7.35	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	08-01-2020	25-01-2021	1	0	18
			Total	1	0	18

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	COMPUTER SCIENCE AND ENGINEEERING
Name of the Degree & Course	B.E.-COMPUTER SCIENCE AND ENGINEERING
Name of the faculty member	MRS. KOKILA G
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	5,KOMBAI THOTTAM, KANGAYAM ROAD
Line 2	TIRUPUR 641604
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 6385328172
Email	KOKILA.KOKIGS@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	DSGPK8601G
Passport Number	
Aadhar Number	793451005051
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	9322712681
Date of Birth	21-11-1986
Age	35
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	COMPUTER SCIENCE AND ENGINEERING	2008	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	76	FIRST CLASS	
P.G.	M.E.	COMPUTER SCIENCE AND ENGINEERING	2013	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	81	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	25-01-2021	1	0	16
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	09-07-2008	03-08-2011	3	0	26
			Total	4	1	12

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.
Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MECHANICAL ENGINEERING
Name of the Degree & Course	B.E.-MECHANICAL ENGINEERING
Name of the faculty member	MR. RAMAKRISHNAN S
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	APPIYAMPATTI
Line 2	ODDENCHATRAM,624619
District	DINDIGUL
Telephone number	-
Mobile number	+91 - 9843020455
Email	RAMAKRISHNAN21595@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	CIRPR7818C
Passport Number	
Aadhar Number	528377879039
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7501231931
Date of Birth	21-05-1995
Age	26

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2016	SRI SUBRAMANYA COLLEGE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	79	FIRST CLASS	
P.G.	M.E.	MANUFACTURING ENGINEERING	2018	SRI SUBRAMANYA COLLEGE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	89	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	29-01-2021	1	0	20
			Total	1	0	20

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.
Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MECHANICAL ENGINEERING
Name of the Degree & Course	B.E.-MECHANICAL ENGINEERING
Name of the faculty member	MR. SATHEESH KUMAR T T
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	126 VARATHARAJULU NAGAR, 6TH STREET
Line 2	GANAPATHY, 641006
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9940583860
Email	SATHEESHKUMARTTS@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	EEWPS4632J
Passport Number	
Aadhar Number	747779460035
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7500532355
Date of Birth	22-01-1978
Age	43

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2006	COIMBATORE INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	66	FIRST CLASS	
P.G.	M.E.	INDUSTRIAL ENGINEERING	2011	ANNA UNIVESITY REGIONAL CAMPUS, COIMBATORE	ANNA UNIVERSITY	8.44	FIRST CLASS	

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I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	29-01-2021	1	0	20
			Total	1	0	20

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	SCIENCE AND HUMANITIES
Name of the Degree & Course	S&H-PHYSICS
Name of the faculty member	MRS. BRINDHA R
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	W/O N PRABHU, NARAYANAN HOUSE, WATER TANK STREET
Line 2	SENTHIL NAGAR, SOMANUR PO SULUR TK
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 8144103966
Email	BRINDHARBINDU92@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	BNJPB8869F
Passport Number	
Aadhar Number	412023292463
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7499934332
Date of Birth	27-02-1992
Age	29

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.SC.	OTHERS - PHYSICS	2012	OTHERS - LRG GOVT ARTS COLLEGE FOR WOMEN TIRUPUR	BHARATHIYAR UNIVERSITY	72	FIRST CLASS	
P.G.	M.SC.	OTHERS - PHYSICS	2014	OTHERS - GOBI ARTS AND SCIENCE COLLEGE	BHARATHIYAR UNIVERSITY	71.4	FIRST CLASS	

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I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	02-01-2020	05-02-2021	1	1	4
			Total	1	1	4

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	SCIENCE AND HUMANITIES
Name of the Degree & Course	B.E.-GENERAL ENGINEERING
Name of the faculty member	MR. PRABHAKARAN T
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	4/1112 INDIRA NAGAR
Line 2	2ND STREET
District	DHARMAPURI
Telephone number	-
Mobile number	+91 - 9940729701
Email	PRABHAKARANMECH.INF@GMAIL.COM
Gender	MALE
Community	MBC
PAN Number	CZLPP6207L
Passport Number	
Aadhar Number	735362819567
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	3540994696
Date of Birth	19-10-1989
Age	32

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2011	ADHIYAMAAN COLLEGE OF ENGINEERING (AUTONOMOUS)	ANNA UNIVERSITY	7.92	FIRST CLASS	
P.G.	M.E.	PRODUCTION ENGINEERING	2015	P S G COLLEGE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	7.02	FIRST CLASS	

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I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	12-07-2017	05-02-2021	3	6	25
ARUNAI ENGINEERING COLLEGE	ASSISTANT PROFESSOR	01-06-2015	09-05-2016	0	11	9
			Total	4	6	7

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	SCIENCE AND HUMANITIES
Name of the Degree & Course	B.E.-GENERAL ENGINEERING
Name of the faculty member	MR. PIRUTHIVI RAM G
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	2/67, NORTH STREET, KADALADI TK
Line 2	RAMANATHAPURAM DT
District	RAMANATHAPURAM
Telephone number	-
Mobile number	+91 - 9894404498
Email	PIRUTHIVIRAM.G@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	DXZPP5676J
Passport Number	
Aadhar Number	419092786589
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7756860235
Date of Birth	29-04-1994
Age	27
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2015	SREE SAKTHI ENGINEERING COLLEGE	ANNA UNIVERSITY	70	FIRST CLASS	
P.G.	M.E.	THERMAL ENGINEERING	2018	SBM COLLEGE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	75	FIRST CLASS	

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I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	28-02-2020	05-02-2021	0	11	7
			Total	0	11	12

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	INSTRUMENTATION AND CONTROL ENGINEERING
Name of the Degree & Course	B.E.-INSTRUMENTATION AND CONTROL ENGINEERING
Name of the faculty member	MR. MAYILSAMY S
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	148, AMARAVATHI PUDUR, KOLATHUPALAYAM, UNJALUR
Line 2	ERODE, 638152
District	ERODE
Telephone number	-
Mobile number	+91 - 9965135163
Email	SMAYILSAMY_ME@YAHOO.CO.IN
Gender	MALE
Community	BC
PAN Number	ALGPM1186J
Passport Number	
Aadhar Number	502600441287
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	9322360873
Date of Birth	30-06-1972
Age	49

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	1996	KONGU ENGINEERING COLLEGE (AUTONOMOUS)	BHARATHIYAR UNIVERSITY	59	SECOND CLASS	
P.G.	M.E.	OTHERS - PROCESS CONTROL AND INSTRUMENTATION	2002	OTHERS - ANNAMALAI UNIVERSITY	ANNAMALAI UNIVERSITY	6.9	FIRST CLASS	

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I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-12-2020	25-01-2021	0	1	25
			Total	0	1	25

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	INSTRUMENTATION AND CONTROL ENGINEERING
Name of the Degree & Course	B.E.-INSTRUMENTATION AND CONTROL ENGINEERING
Name of the faculty member	MR. YUVARAJ D
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	10/50A,MATHANAIKAN PALAYAM,PETHAM PALAYAM PO,KANJIKOVIL VIA,
Line 2	ERODE-638116
District	ERODE
Telephone number	04294 - 235878
Mobile number	+91 - 9865749166
Email	PCIYUVARAJ@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	AERPY7216H
Passport Number	
Aadhar Number	223353619498
Faculty code given by C.O.E.	7142007
Faculty code given by A.I.C.T.E.	452528503
Date of Birth	13-05-1984
Age	37
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRICAL AND ELECTRONICS ENGINEERING	2005	ERODE SENGUNTHAR ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	66	FIRST CLASS	
P.G.	M.E.	OTHERS - PROCESS CONTROL AND INSTRUMENTATION	2007	OTHERS - ANNAMALAI UNIVERSITY	ANNAMALAI UNIVERSITY	6.82	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
MAHARAJA PRITHVI ENGINEERING COLLEGE	OTHERS - LECTURER	27-06-2007	26-03-2009	1	8	30
ERODE SENGUNTHAR ENGINEERING COLLEGE (AUTONOMOUS)	OTHERS - LECTURER	03-06-2009	19-05-2010	0	11	17
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-08-2011	25-01-2021	9	5	25
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	01-06-2010	31-07-2011	1	1	30
			Total	13	4	14

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
8				

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	CIVIL ENGINEERING
Name of the Degree & Course	B.E.-CIVIL ENGINEERING
Name of the faculty member	MR. KARUPPASAMY M
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	133, SALIYAR SOUTH STREET, SUNDRAPANDIAM, SRIVILLIPUTTUR
Line 2	VIRUDHUNAGAR, 626126
District	VIRUDHUNAGAR
Telephone number	-
Mobile number	+91 - 8438981000
Email	K.SAMY94.KM@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	EQUPK1821B
Passport Number	
Aadhar Number	399950922494
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	4558693943
Date of Birth	06-03-1994
Age	27
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	CIVIL ENGINEERING	2016	MADHA ENGINEERING COLLEGE	ANNA UNIVERSITY	7.68	FIRST CLASS	
P.G.	M.TECH.	OTHERS - STRUCTURAL ENGINEERING	2018	OTHERS - KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION	OTHERS - KALASALINGAM UNIVERSITY	8.17	FIRST CLASS	
OTHERS - DIPLOMA	OTHERS - CIVIL ENINEERING	OTHERS - CIVIL ENGINEERING	2013	OTHERS - GOVERNMENT POLYTECHNIC COLLEGE TRICHY	OTHERS - DOTE	72.5	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	17-12-2018	04-02-2021	2	1	19
			Total	2	1	19

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	AUTOMOBILE ENGNEERING
Name of the Degree & Course	B.E.-AUTOMOBILE ENGINEERING
Name of the faculty member	MR. ARUN BABU S
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	3/231 T. NALLIGOUNDEN PALAYAM, THALAKKARI PO, POLLACHI
Line 2	COIMBATORE - 642005
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9042166886
Email	BABUARUN17@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	BJHPA4902Q
Passport Number	
Aadhar Number	445934832953
Faculty code given by C.O.E.	7142236
Faculty code given by A.I.C.T.E.	3371232221
Date of Birth	17-09-1992
Age	29
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2013	DR MAHALINGAM COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	7.69	FIRST CLASS	
P.G.	M.E.	THERMAL ENGINEERING	2016	GOVERNMENT COLLEGE OF ENGINEERING SALEM (AUTONOMOUS)	ANNA UNIVERSITY	8.42	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	20-06-2016	27-01-2021	4	7	8
			Total	4	7	11

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College		7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department		AUTOMOBILE ENGNEERING
Name of the Degree & Course		B.E.-AUTOMOBILE ENGINEERING
Name of the faculty member		MR. MOHANKUMAR P
Regular Or Adjunct		Regular
Image		
Present Designation		ASSISTANT PROFESSOR
Residential Address Line 1		3/70, NYNANPALAYAM, KARUVALUR
Line 2		TIRUPUR DISTRICT - 641670
District		TIRUPPUR
Telephone number		-
Mobile number		+91 - 9791769335
Email		MOHANKUMAR1004@GMAIL.COM
Gender		MALE
Community		BC
PAN Number		BKWPM5521P
Passport Number		
Aadhar Number		668633170578
Faculty code given by C.O.E.		7142237
Faculty code given by A.I.C.T.E.		3363688243
Date of Birth		06-10-1991
Age		30

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2014	INFO INSTITUTE OF ENGINEERING	ANNA UNIVERSITY	70	FIRST CLASS	
P.G.	M.TECH.	OTHERS - AUTOMOTIVE ENGINEERING	2016	OTHERS - AMRITA SCHOOL OF ENGINEERING	OTHERS - AMRITA UNIVERSITY	65	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	18-07-2016	27-01-2021	4	6	10
			Total	4	6	13

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the Degree & Course	B.E.-ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the faculty member	MR. PRADEEP KUMAR M
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	26, RAMAKRISHNA NAGAR, ZAMIN UTHUKULI POST, MEENKARAI ROAD
Line 2	POLLACHI 642004
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 8675510999
Email	PRADEEPEEE63@GMAIL.COM
Gender	MALE
Community	OTHERS - DNC
PAN Number	BPJPP2226Q
Passport Number	
Aadhar Number	299077098926
Faculty code given by C.O.E.	7239069
Faculty code given by A.I.C.T.E.	3541011175
Date of Birth	05-10-1989
Age	32

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRICAL AND ELECTRONICS ENGINEERING	2011	V S B ENGINEERING COLLEGE	ANNA UNIVERSITY	Y	DISTINCTION	
P.G.	M.E.	POWER SYSTEMS ENGINEERING	2015	KIT - KALAIGNARKARUNANIDHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	Y	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	30-06-2017	29-01-2021	3	6	30
ARJUN COLLEGE OF TECHNOLOGY	ASSISTANT PROFESSOR	20-01-2016	20-04-2017	1	3	1
			Total	4	10	5

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
TATA CONSULTANCY SERVICES	ASSISTANT SYSTEM ENGINEER	SUPPORT ENGINEERING	09-02-2012	18-04-2013	1	2	10
				Total	1	2	10

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MASTER OF BUSINESS ADMINISTRATION
Name of the Degree & Course	M.B.A.-MASTER OF BUSINESS ADMINISTRATION
Name of the faculty member	MR. KARTHIKEYAN R
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	1/275 GOBI MAIN ROAD
Line 2	NANJAI PULIAMPATTI, GOBI TK - 638506
District	ERODE
Telephone number	-
Mobile number	+91 - 9865899599
Email	KARTHIKKRK2006@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	BBYPK1531N
Passport Number	
Aadhar Number	575223555290
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	430187995
Date of Birth	28-11-1984
Age	37

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.COM.	COMMERCE	2006	OTHERS - GOBI ARTS AND SCIENCE COLLEGE	BHARATHIYAR UNIVERSITY	60	FIRST CLASS	
P.G.	M.B.A.	MASTER OF BUSINESS ADMINISTRATION(INTEGRATED)	2008	MUTHAYAMMAL ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	69	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	24-09-2008	31-12-2011	3	3	7
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-01-2012	02-02-2021	9	1	2
			Total	12	4	11

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MASTER OF BUSINESS ADMINISTRATION
Name of the Degree & Course	M.B.A.-MASTER OF BUSINESS ADMINISTRATION
Name of the faculty member	MR. GOPALAKRISHNAN R
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	8/3964 A KAMARAJ NAGAR, POOLUVAPATTI
Line 2	TIRUPPUR
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9842673913
Email	GOPAL.R.11210@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	BKRPG2251D
Passport Number	
Aadhar Number	761297948317
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	732735052
Date of Birth	15-05-1993
Age	28
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.SC.	OTHERS - COMPUTER SCIENCE	2014	OTHERS - SASURIE ARTS AND SCIENCE COLLEGE	BHARATHIYAR UNIVERSITY	63	FIRST CLASS	
P.G.	M.B.A.	MASTER OF BUSINESS ADMINISTRATION	2016	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	62	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	23-10-2017	02-02-2021	3	3	11
			Total	3	3	12

V. Industrial Experience :

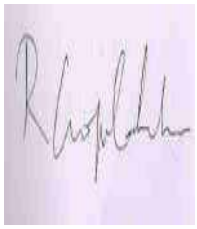
Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MASTER OF BUSINESS ADMINISTRATION
Name of the Degree & Course	M.B.A.-MASTER OF BUSINESS ADMINISTRATION
Name of the faculty member	MR. VIVEK R
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	30, TSR LAYOUT, IST CROSS STREET
Line 2	TIRUPPUR
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9789449908
Email	P.R.VIVEK237@GMIL.COM
Gender	MALE
Community	MBC
PAN Number	AOZPV0552R
Passport Number	
Aadhar Number	272299952952
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	2190405627
Date of Birth	17-11-1993
Age	28
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.B.A.	BUSINESS ADMINISTRATION	2014	OTHERS - PARKS COLLEGE	BHARATHIYAR UNIVERSITY	62	FIRST CLASS	
P.G.	M.B.A.	MASTER OF BUSINESS ADMINISTRATION	2016	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	61	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	23-10-2017	02-02-2021	3	3	11
			Total	3	3	12

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MASTER OF BUSINESS ADMINISTRATION
Name of the Degree & Course	M.B.A.-MASTER OF BUSINESS ADMINISTRATION
Name of the faculty member	MR. SARAVANAKUMAR V
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	3/188 A PARIYAN TOTTAM, MANASIPALAYAM,
Line 2	PALLADAM
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9865141343
Email	SARAVANABBASARAVANA@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	FSNPS9020L
Passport Number	
Aadhar Number	802571337099
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	732455656
Date of Birth	21-12-1993
Age	28

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.B.A.	BUSINESS ADMINISTRATION	2014	OTHERS - DR SNS RAJALAKSHMI COLLEGE OF ARTS AND SCIENCE	BHARATHIYAR UNIVERSITY	62	FIRST CLASS	
P.G.	M.B.A.	MASTER OF BUSINESS ADMINISTRATION	2016	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	63	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	20-10-2017	02-02-2021	3	3	14
			Total	3	3	15

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	SCIENCE AND HUMANITIES
Name of the Degree & Course	S&H-ENGLISH
Name of the faculty member	MR. SARAVANAN K
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	13/10 PALLADAM ROAD, OKKILIPALAYAM
Line 2	OTHAKKALMANDAMPAM POST 641 032
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9698829065
Email	SARAVANAKMD55@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	EIHPS3738A
Passport Number	
Aadhar Number	377660778075
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	4528301823
Date of Birth	31-05-1994
Age	27

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.A.	ENGLISH	2014	OTHERS - RAMAKRISHNA MISSION VIDYALAYA ARTS AND SCIENCE COLLEGE	BHARATHIYAR UNIVERSITY	61	FIRST CLASS	
P.G.	OTHERS - M.A.	OTHERS - ENGLISH	2016	OTHERS - KONGUNADU COLLEGE OF ARTS AND SCIENCE	BHARATHIYAR UNIVERSITY	62	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	17-06-2019	18-01-2021	1	7	2
			Total	1	7	5

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the Degree & Course	B.E.-ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the faculty member	MRS. CHRISTYJULIET B
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	1/19, NEW MULLAI NAGAR, RAJIV GANDHI ROAD, GANAPATHY
Line 2	COIMBATORE-641006
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 8072605618
Email	CHRISTY.SMILY@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	BEXPC3356R
Passport Number	
Aadhar Number	756915436599
Faculty code given by C.O.E.	7115252
Faculty code given by A.I.C.T.E.	4220719669
Date of Birth	09-12-1991
Age	30

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRICAL AND ELECTRONICS ENGINEERING	2013	SNS COLLEGE OF ENGINEERING (AUTONOMOUS)	ANNA UNIVERSITY	8.71	DISTINCTION	
P.G.	M.E.	POWER SYSTEMS ENGINEERING	2015	KIT - KALAIGNARKARUNANIDHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	8.24	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
KIT - KALAIGNARKARUNANIDHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ASSISTANT PROFESSOR	24-06-2015	13-05-2016	0	10	20
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	13-07-2018	29-01-2021	2	6	17
			Total	3	5	10

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MASTER OF BUSINESS ADMINISTRATION
Name of the Degree & Course	M.B.A.-MASTER OF BUSINESS ADMINISTRATION
Name of the faculty member	MRS. KRISHNAVENI N
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	3/208 ANNAIPUDUR, THIRUMURUGAN POONDI
Line 2	TIRUPUR 641652
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9965660468
Email	KRISHNA_VENI66@YAHOO.COM
Gender	FEMALE
Community	BC
PAN Number	CAFPK1933F
Passport Number	K0414467
Aadhar Number	757575380339
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	4213251065
Date of Birth	21-03-1983
Age	38

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.SC.	OTHERS - COMPUTER SCIENCE	2003	OTHERS - TIRUPUR COLLEGE FOR WOMEN	BHARATHIYAR UNIVERSITY	67	FIRST CLASS	
P.G.	M.B.A.	MASTER OF BUSINESS ADMINISTRATION	2005	MAHARAJA ENGINEERING COLLEGE	ANNA UNIVERSITY	71	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	19-09-2018	02-02-2021	2	4	14
MAHARAJA ENGINEERING COLLEGE	OTHERS - LECTURER	19-08-2005	30-04-2010	4	8	13
			Total	7	0	28

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	CIVIL ENGINEERING
Name of the Degree & Course	B.E.-CIVIL ENGINEERING
Name of the faculty member	MRS. ANUSHA MARTIN
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	46/394,VAVAKKATTU, ARATTUVAZHI ALAPPUZHA NORTH S.O
Line 2	ALAPPUZHA,688007
District	OTHERS - ALAPPUZHA
Telephone number	-
Mobile number	+91 - 9847466031
Email	ANUSHAMARTIN08@GMAIL.COM
Gender	FEMALE
Community	OC
PAN Number	CNIPM2769K
Passport Number	
Aadhar Number	912150989881
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	366418907
Date of Birth	17-08-1988
Age	33

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	CIVIL ENGINEERING	2010	OTHERS - AMAL JYOTHI COLLEGE OF ENGINEERING	OTHERS - MAHATMA GANDHI UNIVERSITY	7.47	FIRST CLASS	
P.G.	M.E.	OTHERS - PLANNING HOUSING	2012	OTHERS - COLLEGE OF ENGINEERING TRIVANDRUM	OTHERS - KERALA UNIVERSITY	8.19	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	22-12-2017	04-02-2021	3	1	14
OTHERS - COLLEGE OF ENGINEERING AND MANAGEMENT PUNNAPRA	ASSISTANT PROFESSOR	13-08-2012	31-12-2013	1	4	19
OTHERS - ALBERTIAN INSTITUTE OF SCIENCE AND TECHNOLOGY	ASSISTANT PROFESSOR	01-01-2014	20-12-2017	3	11	20
			Total	8	5	26

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the Degree & Course	B.E.-ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the faculty member	MRS. GOKILA R
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	3/14-1,MUTHUGOUNDANPUDUR,SULUR VIA,
Line 2	COIMBATORE-641406.
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9842574396
Email	HI.GOKS@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	AKSPR5470M
Passport Number	F8545773
Aadhar Number	712930948882
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	437118561
Date of Birth	12-03-1984
Age	37

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND INSTRUMENTATION ENGINEERING	2006	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	82	DISTINCTION	
P.G.	M.E.	EMBEDDED SYSTEMS	2013	OTHERS - KARPAGAM UNIVERSITY	OTHERS - KARPAGAM UNIVERSITY	8.6	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	11-09-2009	30-11-2015	6	2	20
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-12-2015	29-01-2021	5	1	29
			Total	11	4	20

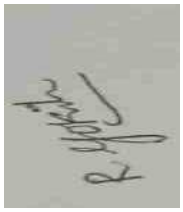
V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
WIPRO TECHNOLOGIES	PROJECT ENGINEER	DESIGN AND DEVELOPMENT	25-09-2006	30-04-2009	2	7	6
				Total	2	7	8

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
		1		

It is certified that all the information provided are true to the best of my knowledge.
Signature of the Faculty : 

PROFILE OF FACULTY
NAME : SIVARANJANI R
DOB: 13.12.1995
UNIQUE ID :7142269
EDUCATIONAL QUALIFICATION:

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
UG	B.E	CSE	2017	KPR INSTITUTE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	8.4	FIRST CLASS	
P.G.	M.E	CSE	2019	KPR INSTITUTE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	8.6	FIRST CLASS	
PH.D.								

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION
Score :
File :

II. Title of Ph.D. Thesis	
III. Faculty in which Ph.D. was awarded	
IV. Academic Experience : **(Start from the Current working Experience) ***	

TEACHING EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Date for	EXPERIENCE YEAR MONTH DAY

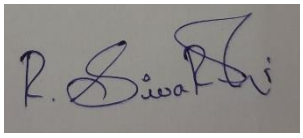
			Presently Working INSTITUTION			
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	02.08.2019	18.02.2022	2	7	17

TOTAL:

INDUSTRIAL EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Date for Presently Working INSTITUTION	EXPERIENCE YEAR	MONTH	DAY

TOTAL:



SIGNATURE OF FACULTY:

PROFILE OF FACULTY
NAME :GANESH R
DOB:02.02.1987
UNIQUE ID :7142269
EDUCATIONAL QUALIFICATION:

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
UG	B.TECH	INFORMATION TECHNOLOGY	2008	SRM UNIVERSITY	SRM UNIVERSITY	6.38	SECOND CLASS	
P.G.	M.E	CSE	2011	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	8.27	FIRST CLASS	
PH.D.								

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION
Score :
File :

II. Title of Ph.D. Thesis	
III. Faculty in which Ph.D. was awarded	
IV. Academic Experience : **(Start from the Current working Experience) ***	

TEACHING EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Date for Presently Working INSTITUTION	EXPERIENCE YEAR MONTH DAY

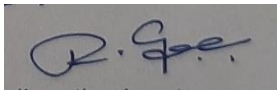
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	02.08.2019	TAMILNADU COLLEGE OF ENGINEERING	2	7	17

TOTAL:

INDUSTRIAL EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Date for Presently Working INSTITUTION	EXPERIENCE YEAR	MONTH	DAY
WALEED ADVERTISING, SAUDI ARABIA	ADMINISTRATIVE MANAGER & DOCUMENT CONTROLLER	26.09.2018	12.11.2019	1	2	15
MAHENDRA POLYTECHNIC COLLEGE	ASSISTANT ADMINISTRATIVE OFFICER	01.03.2017	12.09.2018	1	4	11
N.GOVINDA CHETTIAR SONS	ADMINISTRATIVE MANAGER	02.03.2011	30.04.2017	6	2	10

TOTAL:



SIGNATURE OF FACULTY:

PROFILE OF FACULTY
NAME : RAMYA T
DOB:28.03.1988
UNIQUE ID :7142269
EDUCATIONAL QUALIFICATION:

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
UG	B.TECH	INFORMATION TECHNOLOGY	2009	VELLALAR COLLEGE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	7.7	FIRST CLASS	
P.G.	M.E	CSE	2011	SASURIE COLLEGE OF ENGINEERING	ANNA UNIVERSITY	8.8	FIRST CLASS	
PH.D.								

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION
Score :
File :

II. Title of Ph.D. Thesis	
III. Faculty in which Ph.D. was awarded	
IV. Academic Experience : **(Start from the Current working Experience) ***	

TEACHING EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Date for	EXPERIENCE YEAR MONTH DAY

			Presently Working INSTITUTION			
KSR COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01.09.2014	31.05.2016	1	9	1

TOTAL:

INDUSTRIAL EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Date for Presently Working INSTITUTION	EXPERIENCE YEAR	MONTH	DAY

TOTAL:

SIGNATURE OF FACULTY:

PROFILE OF FACULTY
NAME : P.SELVAN
DOB: 21.05.1986
UNIQUE ID :
EDUCATIONAL QUALIFICATION:

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
UG	BE	Mechanical Engineering	2009	Kongu Engineering College	Anna University	75%	First Class with Distinction	
P.G.	ME	Thermal Engineering	2014	Government College of Engineering	Anna University	8.5CGPA	First class with distinction	
Ph.D	NIL	NIL	NIL	NIL	NIL	NIL	NIL	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION
Score :
File :

II. Title of Ph.D. Thesis	NA
III. Faculty in which Ph.D. was awarded	NA
IV. Academic Experience : **(Start from the Current working Experience) ***	

TEACHING EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Datefor PresentlyWorking INSTITUTION	EXPERIENCE YEAR	MONTH	DAY
Tamilnadu College of Engineering	Assistant Professor	07.04.2021	18.02.2022		10 Months	12Days
SNS College of Engineering	Assistant Professor	18.06.2014	31.12.2020	6 Years	6 Months	13 Days

TOTAL: 7 Years 4 Months 25 Days

INDUSTRIAL EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Date for Presently Working INSTITUTION	EXPERIENCE YEAR	MONTH	DAY

TOTAL: Nil

SIGNATURE OF FACULTY:

PROFILE OF FACULTY
NAME : P S VINOTH KUMAR
DOB: 15/07/1975
UNIQUE ID :
EDUCATIONAL QUALIFICATION: B

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U G	B.A ECONOMICS	ECONOMICS	1997	ERODE ARTS COLLEGE	BHARATHIAR UNIVERSITY	50 %	III CLASS	AVAIL
P.G.	MPES	PHYSICAL EDUCATION	2002	ANNAMALAI UNICERSITY	ANNAMALAI UNIVERSITY	67%	I CLASS	AVAIL
M.Phil		PHYSICAL EDUCATION	2008		ANNAMALAI UNIVERSITY	55%	II CLASS	AVAIL
PH.D.		PHYSICAL EDUCATION	2021	ANNAMALAI UNIVERSITY		WAITING FOR VIVA		

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION
Score :
File :

II. Title of Ph.D. Thesis	**EFFECT OF YOGIC AND FLEXIABLITY TRAININGS ON SELECTED PHYSICAL PHYSIOLOGICAL AND PSYCHOLOGICAL VARIABLES AMONG COLLEGE PLAYERS**
III. Faculty in which Ph.D. was awarded	

IV. Academic Experience : **(Start from the Current working Experience) ***	

TEACHING EXPERIENCE:

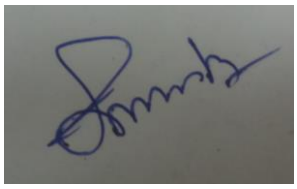
Name of the College	Designation	Joining Date	Relieving Date/ Current Datefor PresentlyWorking INSTITUTION	EXPERIENCE YEAR	MONTH	DAY
KSR COLLEGE OF ENGINEERING	PHYSICAL DIRECTOR	01/09/2003	31/05/2016	12	4	-
KSG COLLEGE OF ARTS AND SCIENCE	PHYSICAL DIRECTOR	22/07/2017	16/05/2020	2	10	
PRESENTLY WORKING IN TAMILNADU COLLEGE OF ENGINEERING	PHYSICAL DIRECTOR	24/03/2021	TILL WORKING		11	
				14 Y	25 M	

TOTAL:

INDUSTRIAL EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Date for Presently Working INSTITUTION	EXPERIENCE YEAR	MONTH	DAY

TOTAL:



SIGNATURE OF FACULTY:

PROFILE OF FACULTY

NAME : JESLIN RENISHA G A
DOB: 19-04-1998
UNIQUE ID : 7142286
EDUCATIONAL QUALIFICATION: M.Sc Chemistry

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
UG	B.Sc	Chemistry	2019	Sarah Tucker College, Tiruneveli-627007	MS University	78	1st Class with distinction	
PG	M.Sc	Chemistry	2021	Sarah Tucker College, Tiruneveli-627007	MS University	81.2	1st class with distinction	
PH.D.								

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION
Score :
File :

II. Title of Ph.D. Thesis	
III. Faculty in which Ph.D. was awarded	
IV. Academic Experience : **(Start from the Current working Experience) ***	

TEACHING EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Date for Presently Working INSTITUTION	EXPERIENCE YEAR	MONTH	DAY
Tamilnadu College of Engineering , Coimbatore	Assistant Professor	17-11-2021	18-02-2022	0	0	3

TOTAL: 3 months

INDUSTRIAL EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Date for Presently Working INSTITUTION	EXPERIENCE YEAR MONTH DAY		

TOTAL:nil

SIGNATURE OF FACULTY:

PROFILE OF FACULTY
NAME : SANTHOSH R
DOB: 14.09.1998
UNIQUE ID :
EDUCATIONAL QUALIFICATION:

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
UG	B.COM	BANKING AND INSURANCE	2018	DR.NGP ARTS AND SCIENCE COLLEGE	BHARATHIAR	62%	FIRST CLASS	
P.G.	MBA	HR AND FINANCE	2021	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	79%	FIRST CLASS	
PH.D.	NILL	NILL	NILL	NILL	NILL	NILL	NILL	NILL

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION
Score :
File :

II. Title of Ph.D. Thesis	NA

III. Faculty in which Ph.D. was awarded	NA
IV. Academic Experience : **(Start from the Current working Experience) ***	

TEACHING EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Date for Presently Working INSTITUTION	EXPERIENCE YEAR MONTH DAY		
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	17.11.2021	18.02.2022		03 MONTHS	01 DAYS

TOTAL: 3 MONTHS 1 DAYS

INDUSTRIAL EXPERIENCE:

Name of the College	Designation	Joining Date	Relieving Date/ Current Date for Presently Working INSTITUTION	EXPERIENCE YEAR MONTH DAY		

TOTAL: NIL

SIGNATURE OF FACULTY:

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the Degree & Course	B.E.-ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the faculty member	MS. RAMYA M V
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	34, KATTUVALAVU STREET, MODACHUR
Line 2	GOBICHETTIPALAYAM- 638476
District	ERODE
Telephone number	-
Mobile number	+91 - 9489766550
Email	RAMYAVENKIDU289@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	DBHPR7098C
Passport Number	
Aadhar Number	915108882693
Faculty code given by C.O.E.	7142244
Faculty code given by A.I.C.T.E.	3541091762
Date of Birth	28-09-1992
Age	29

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRICAL AND ELECTRONICS ENGINEERING	2014	SRIGURU INSTITUTE OF TECHNOLOGY	ANNA UNIVERSITY	6.8	FIRST CLASS	
P.G.	M.E.	POWER ELECTRONICS AND DRIVES	2016	KONGU ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	7.32	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	30-06-2017	29-01-2021	3	6	30
			Total	3	6	3

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	AUTOMOBILE ENGNEERING
Name of the Degree & Course	B.E.-AUTOMOBILE ENGINEERING
Name of the faculty member	MR. YAKNESH S
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	NO.7/8, SREE AMMAN NAGAR, VISUVASAPURAM
Line 2	COIMBATORE, 641037
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9841070970
Email	YAKI.THERMAL@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	AEUPY4850N
Passport Number	
Aadhar Number	945619975704
Faculty code given by C.O.E.	7142246
Faculty code given by A.I.C.T.E.	3541010858
Date of Birth	16-01-1988
Age	33
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	AERONAUTICAL ENGINEERING	2009	TAGORE ENGINEERING COLLEGE	ANNA UNIVERSITY	68	FIRST CLASS	
P.G.	M.E.	THERMAL ENGINEERING	2013	GOVERNMENT COLLEGE OF TECHNOLOGY COIMBATORE (AUTONOMOUS)	ANNA UNIVERSITY	8.89	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	28-06-2017	27-01-2021	3	6	30
ST JOSEPH'S COLLEGE OF ENGINEERING AND TECHNOLOGY	ASSISTANT PROFESSOR	15-07-2013	05-05-2015	1	9	22
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-08-2015	07-05-2016	0	8	29
			Total	6	1	22

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
WEIR MINERALS	DESIGN CONSULTANT	DESIGN MODELLING	17-07-2009	20-12-2010	1	5	4
GENSER AEROSPACE	ASSISTANT ENGINEER	DESIGN MODELLING	03-01-2011	31-05-2011	0	4	29
				Total	1	10	6

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the Degree & Course	B.E.-ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the faculty member	MS. DARTHY RABECKA V
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	18/60 NARAYANASWAMY LAYOUT, IRUGUR
Line 2	COIMBATORE, 641103
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9003924708
Email	DARTHYRABECKA@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	CMJPD1137J
Passport Number	
Aadhar Number	578843480894
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7502983034
Date of Birth	22-09-1992
Age	29

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	2014	MOOKAMBIGAI COLLEGE OF ENGINEERING	ANNA UNIVERSITY	77	FIRST CLASS	
P.G.	M.TECH.	OTHERS - COMMUNICATION SYSTEMS	2016	OTHERS - SASTRA UNIVERSITY	OTHERS - SASTRA UNIVERSITY	81	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	29-01-2021	1	0	20
			Total	1	0	20

V. Industrial Experience :

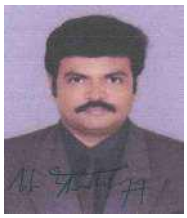
Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
TATA CONSULTANCY SERVICES	ASSISTANT SYSTEM ENGINEER	ASSISTANT	11-07-2016	07-09-2018	2	1	28
				Total	2	1	28

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.
 **Signature of the Faculty** :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	CIVIL ENGINEERING
Name of the Degree & Course	B.E.-CIVIL ENGINEERING
Name of the faculty member	MR. THULASIRAJAN S D
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	13/44 TELUGU NAGAR, SOMANUR, KARUMATHAMPATTY
Line 2	COIMBATORE - 641659
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9843592410
Email	THULASIRAJANSD.CIVIL@TNCE.IN
Gender	MALE
Community	BC
PAN Number	AJNPT6024B
Passport Number	
Aadhar Number	681778155236
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7503815348
Date of Birth	29-10-1981
Age	40

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	CIVIL ENGINEERING	2006	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	63	SECOND CLASS	
P.G.	M.E.	STRUCTURAL ENGINEERING	2011	KARPAGAM COLLEGE OF ENGINEERING (AUTONOMOUS)	OTHERS - KARPAGAM UNIVERSITY	78	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	04-02-2021	1	0	26
			Total	1	0	26

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
MAHESH ARCHITECTS	PROJECT COORDINATOR	CONSTRUCTION	01-12-2009	30-03-2011	1	3	30
OWN CONCERN	CONSULTANT	DESIGN AND CONSTRUCTION	01-06-2011	31-05-2013	1	11	30
SUNDARSUNDARAM	SITE ENGINEER	DESIGN AND CONSTRUCTION	01-05-2006	30-11-2009	3	6	31
				Total	6	10	4

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	INSTRUMENTATION AND CONTROL ENGINEERING
Name of the Degree & Course	B.E.-INSTRUMENTATION AND CONTROL ENGINEERING
Name of the faculty member	MR. RAMESH KUMAR N
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	KENDAIYUR ROAD, KAMARAJ STREET, METTUPALAYAM
Line 2	COIMBATORE, 641305
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9600270794
Email	INSTRUKNIGHT@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	CTZPR6794Q
Passport Number	
Aadhar Number	795695218173
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7528555873
Date of Birth	10-05-1985
Age	36

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND INSTRUMENTATION ENGINEERING	2006	ERODE SENGUNTHAR ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	77	DISTINCTION	
P.G.	M.E.	EMBEDDED SYSTEMS	2015	OTHERS - KARPAGAM UNIVERSITY	OTHERS - KARPAGAM UNIVERSITY	8.94	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	08-01-2020	25-01-2021	1	0	18
			Total	1	0	18

V. Industrial Experience :

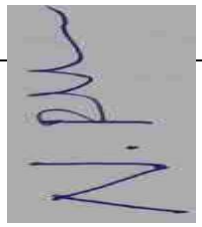
Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
INSTRUMENT INDIA	TECHNICAL ENGINEER	FEILD INSTRUMENTS ENGINEER	22-01-2007	20-04-2012	5	2	30
				Total	5	2	0

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	COMPUTER SCIENCE AND ENGINEEERING
Name of the Degree & Course	B.E.-COMPUTER SCIENCE AND ENGINEERING
Name of the faculty member	MRS. SATHYA N
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	SEGUDANTHALI, SULUR
Line 2	641659
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9788886669
Email	SATHYAN@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	EVDPS2553C
Passport Number	
Aadhar Number	686700269368
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	731383380
Date of Birth	01-04-1985
Age	36
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	COMPUTER SCIENCE AND ENGINEERING	2006	P G P COLLEGE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	77	DISTINCTION	
P.G.	M.E.	OTHERS - COMPUTER COMMUNICATION ENGINEERING	2011	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	93	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
M KUMARASAMY COLLEGE OF ENGINEERING (AUTONOMOUS)	OTHERS - LECTURER	22-02-2007	22-11-2007	0	9	1
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	25-01-2021	1	0	16
STUDYWORLD COLLEGE OF ENGINEERING (FORMERLY KALAIVANI COLLEGE OF TECHNOLOGY)	ASSISTANT PROFESSOR	02-07-2012	22-04-2019	6	9	21
			Total	8	7	12

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	CIVIL ENGINEERING
Name of the Degree & Course	B.E.-CIVIL ENGINEERING
Name of the faculty member	MR. GOPALAKRISHNAN S
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	124-3, PANDIAN STREET, BHAVANI MAIN ROAD
Line 2	PERUNDURAI
District	ERODE
Telephone number	-
Mobile number	+91 - 9965266826
Email	GOPAL.2120@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	CKWPS9980B
Passport Number	
Aadhar Number	659630205745
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	9438573618
Date of Birth	20-05-1985
Age	36
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	CIVIL ENGINEERING	2009	K S R COLLEGE OF ENGINEERING (AUTONOMOUS)	ANNA UNIVERSITY	63	FIRST CLASS	
P.G.	M.E.	STRUCTURAL ENGINEERING	2011	K S R COLLEGE OF ENGINEERING (AUTONOMOUS)	ANNA UNIVERSITY	7.23	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	04-02-2021	19-03-2021	0	1	16
			Total	0	1	16

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.
Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the Degree & Course	B.E.-ELECTRICAL AND ELECTRONICS ENGINEERING
Name of the faculty member	MRS. RAMYA G
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	NO.288,SOURNAPURI RICHLAND,RAKKIYAPALAYAM,AMMAPALAYAM,
Line 2	TIRUPUR-641603.
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9500447223
Email	RAMYAGOVINDASAMY@GMAIL.COM
Gender	FEMALE
Community	MBC
PAN Number	BFLPR0632G
Passport Number	
Aadhar Number	421070724332
Faculty code given by C.O.E.	7142043
Faculty code given by A.I.C.T.E.	434678671
Date of Birth	15-05-1982
Age	39

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRICAL AND ELECTRONICS ENGINEERING	2003	MAILAM ENGINEERING COLLEGE	OTHERS - MADRAS UNIVERSITY	66.5	FIRST CLASS	
P.G.	M.E.	POWER SYSTEMS ENGINEERING	2010	OTHERS - ANNAMALAI UNIVERSITY	ANNAMALAI UNIVERSITY	8.42	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis NIL

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	~~Relieving Date~~ / Current Date for Presently ~~Working~~ Institutions	Experience		
				Years	Months	Days
OTHERS - ARULMIGU CHANDIKESWARAH POLYTECHNIC COLLEGE	OTHERS - LECTURER	22-12-2006	30-04-2007	0	4	10
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	02-06-2010	31-07-2011	1	1	29
OTHERS - VIVEKANANTHA POLYTECHNIC COLLEGE	OTHERS - LECTURER	02-06-2006	29-11-2006	0	5	28
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-08-2011	29-01-2021	9	5	29
			Total	11	6	8

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
ACS AUTOMATION SOLUTIONS	PROGRAMMER	PROGRAMMING	01-09-2003	28-02-2005	1	5	30
				Total	1	5	2

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	AUTOMOBILE ENGNEERING
Name of the Degree & Course	B.E.-AUTOMOBILE ENGINEERING
Name of the faculty member	MR. RADHAKRISHNAN G
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	37D, A.K.PALANIAPPA STREET, SECOND CROSS,
Line 2	ANTHIYUR,638501
District	ERODE
Telephone number	-
Mobile number	+91 - 9790309904
Email	RADHAKRISHNANORB@GMAIL.COM
Gender	MALE
Community	MBC
PAN Number	CATPR8474A
Passport Number	
Aadhar Number	985136300489
Faculty code given by C.O.E.	7142216
Faculty code given by A.I.C.T.E.	2971681525
Date of Birth	07-03-1988
Age	33

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2009	ADHIYAMAAN COLLEGE OF ENGINEERING (AUTONOMOUS)	ANNA UNIVERSITY	72.85	FIRST CLASS	
P.G.	M.E.	ENGINEERING DESIGN	2014	ANNA UNIVESITY REGIONAL CAMPUS, COIMBATORE	ANNA UNIVERSITY	7.34 CGPA	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	30-03-2015	27-01-2021	5	9	29
			Total	5	9	3

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	SCIENCE AND HUMANITIES
Name of the Degree & Course	S&H-CHEMISTRY
Name of the faculty member	MRS. KAVITHA B
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	37, JJ NAGAR, 3RD CROSS STREET, EDAYARPALAYAM
Line 2	COIMBATORE, 641025
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9843706006
Email	KAVITHACHEM87@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	IEBPK1330E
Passport Number	
Aadhar Number	560938551806
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7499353344
Date of Birth	29-05-1985
Age	36

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.SC.	OTHERS - CHEMISTRY	2006	OTHERS - GOVERNMENT ARTS COLLEGE COIMBATORE	BHARATHIYAR UNIVERSITY	71	FIRST CLASS	
P.G.	M.SC.	OTHERS - CHEMISTRY	2009	OTHERS - AVINASHILINGAM UNIVERSITY FOE WOMEN	OTHERS - AVINASHILINGAM UNIVERSITY	73	FIRST CLASS	
OTHERS - M.PHIL	OTHERS - M.PHIL	OTHERS - CHEMISTRY	2011	OTHERS - AVINASHILINGAM UNIVERSITY FOR WOMEN	OTHERS - AVINASHILINGAM UNIVERSITY	70	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	29-07-2019	05-02-2021	1	6	8
DHANALAKSHMI SRINIVASAN COLLEGE OF ENGINEERING (CBE)	ASSISTANT PROFESSOR	02-07-2013	30-06-2014	0	11	30
			Total	2	6	11

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the Degree & Course	B.E.-ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the faculty member	MS. PRIYADHARSHINI S
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	NO.25, FIRST FLOOR, VENKATASAMY NAGAR, ATHIPALAYAM, GANAPATHY
Line 2	COIMBATORE-641006
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 8489887031
Email	PRIYAMAHA891@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	FHTPP8039P
Passport Number	
Aadhar Number	487426842875
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7502697058
Date of Birth	03-04-1996
Age	25

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	2017	COIMBATORE INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	7.14	FIRST CLASS	
P.G.	M.E.	APPLIED ELECTRONICS	2019	COIMBATORE INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	8.40	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	04-07-2019	29-01-2021	1	6	26
			Total	1	6	29

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	CIVIL ENGINEERING
Name of the Degree & Course	B.E.-CIVIL ENGINEERING
Name of the faculty member	MR. BALAJI K
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	56 / 1A, NETHAJI ROAD, P.N. PUDUR, MARUTHA MALAI ROAD,
Line 2	COIMBATORE - 641041
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9585316816
Email	BALAJIJOSHUIVA@YAHOO.COM
Gender	MALE
Community	BC
PAN Number	ARGPB2284G
Passport Number	
Aadhar Number	975665433869
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7503815341
Date of Birth	04-09-1978
Age	43

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	CIVIL ENGINEERING	2015	GOVERNMENT COLLEGE OF TECHNOLOGY COIMBATORE (AUTONOMOUS)	ANNA UNIVERSITY	76.4	FIRST CLASS	
P.G.	M.E.	STRUCTURAL ENGINEERING	2018	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	77.3	FIRST CLASS	
OTHERS - DIPLOMA	OTHERS - CIVIL	OTHERS - DCE	2000	OTHERS - NACHIMUTHU POLYTECHNIC	OTHERS - DOTE	84.5	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	04-02-2021	1	0	26
			Total	1	0	26

V. Industrial Experience :

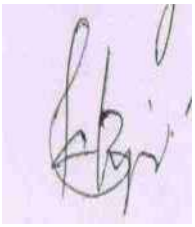
Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	COMPUTER SCIENCE AND ENGINEEERING
Name of the Degree & Course	B.E.-COMPUTER SCIENCE AND ENGINEERING
Name of the faculty member	MR. SATHISHKUMAR C
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	NICHAMPALAYAM, MANUVAKADU
Line 2	638055
District	ERODE
Telephone number	-
Mobile number	+91 - 9944383438
Email	SATHISKUMARC@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	CMJPS9858K
Passport Number	
Aadhar Number	564523040206
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7502329778
Date of Birth	18-07-1984
Age	37
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	COMPUTER SCIENCE AND ENGINEERING	2006	NANDHA ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	66	FIRST CLASS	
P.G.	M.E.	COMPUTER SCIENCE AND ENGINEERING	2012	MAHENDRA ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	81	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSOCIATE PROFESSOR	18-06-2012	20-06-2016	4	0	3
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	25-01-2021	1	0	16
			Total	5	0	19

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	COMPUTER SCIENCE AND ENGINEEERING
Name of the Degree & Course	B.E.-COMPUTER SCIENCE AND ENGINEERING
Name of the faculty member	MS. DIVYA P
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	2/13,MAIN ROAD, THOGAIPADI, KONDANGI
Line 2	605301
District	VILLUPURAM
Telephone number	-
Mobile number	+91 - 8122888752
Email	DIVYAIT2009@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	CJJPD9242B
Passport Number	
Aadhar Number	316354818473
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7502571261
Date of Birth	23-09-1991
Age	30
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.TECH.	INFORMATION TECHNOLOGY	2013	EASWARI ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	70	FIRST CLASS	
P.G.	M.E.	COMPUTER SCIENCE AND ENGINEERING	2015	S A ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	80	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSOCIATE PROFESSOR	10-01-2020	25-01-2021	1	0	16
A S L PAULS COLLEGE OF ENGINEERING AND TECHNOLOGY	ASSOCIATE PROFESSOR	07-01-2016	17-10-2018	2	9	11
			Total	3	9	1

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	COMPUTER SCIENCE AND ENGINEEERING
Name of the Degree & Course	B.E.-COMPUTER SCIENCE AND ENGINEERING
Name of the faculty member	MRS. KOKILA R
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	340, MAIN ROAD, OTHAKUDHIRAI, K.METTUPALAYAM, GOBI
Line 2	638455
District	ERODE
Telephone number	-
Mobile number	+91 - 9976547112
Email	RKOKILACSE@TNCE.IN
Gender	FEMALE
Community	BC
PAN Number	DNFPK7321P
Passport Number	
Aadhar Number	672174672930
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	1421156977
Date of Birth	13-05-1988
Age	33
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	COMPUTER SCIENCE AND ENGINEERING	2009	ERODE SENGUNTHAR ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	77	DISTINCTION	
P.G.	M.E.	COMPUTER SCIENCE AND ENGINEERING	2012	SRI SHAKTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	8.91	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	25-01-2021	1	0	16
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	04-09-2012	22-04-2019	6	7	19
			Total	7	8	8

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the Degree & Course	B.E.-ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the faculty member	MR. LOKESH S
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	41, 1/43 SATHY MAIN ROAD, KASIPALAYAM POST,
Line 2	GOBI, 638454
District	ERODE
Telephone number	-
Mobile number	+91 - 9566419677
Email	SRI.LOKESH5991@GMAIL.COM
Gender	MALE
Community	MBC
PAN Number	AMCPL6969K
Passport Number	
Aadhar Number	557000923219
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7503084422
Date of Birth	05-06-1992
Age	29

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	2015	SRI SAI RANGANATHAN ENGINEERING COLLEGE (FORMERLY RANGANATHAN ENGINEERING COLLEGE)	ANNA UNIVERSITY	71	FIRST CLASS	
P.G.	M.E.	VLSI DESIGN	2015	KIT - KALAIGNARKARUNANIDHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	7.87	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	29-01-2021	1	0	20
			Total	1	0	20

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

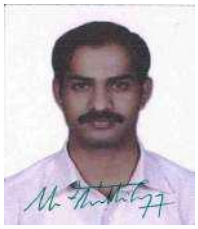
VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the Degree & Course	B.E.-ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the faculty member	MR. THIRUVENGADAM R
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	4, FIRST MAIN ROAD, MEENA ESTATE, SOWRIPALAYAM ROAD,
Line 2	COIMBATORE, 641028
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9894461815
Email	THIRUKVP@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	AIAPT9383M
Passport Number	
Aadhar Number	722965104937
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7503084428
Date of Birth	10-05-1985
Age	36
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	2006	OTHERS - AMIRTHA INSTITUTE OF TECHNOLOGY AND SCIENCE	ANNA UNIVERSITY	64	FIRST CLASS	
P.G.	M.E.	COMMUNICATION SYSTEMS	2008	KUMARAGURU COLLEGE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	72	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	29-01-2021	1	0	20
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-08-2011	29-03-2019	7	7	29
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - LECTURER	01-06-2009	31-07-2011	2	1	30
			Total	10	10	23

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the Degree & Course	B.E.-ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the faculty member	MR. THANGAVEL V
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	OPP AMBAL MARUTHI CAR SHOWROOM
Line 2	SATHYAMANGALAM
District	ERODE
Telephone number	-
Mobile number	+91 - 9448591949
Email	V.THANGAVEL@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	AKPPT9029H
Passport Number	
Aadhar Number	410956534483
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7502983576
Date of Birth	30-07-1986
Age	35
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	2008	CHRISTIAN COLLEGE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	68	FIRST CLASS	
P.G.	M.E.	APPLIED ELECTRONICS	2010	BANNARI AMMAN INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	75	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	29-01-2021	1	0	20
DR N G P INSTITUTE OF TECHNOLOGY	ASSISTANT PROFESSOR	05-06-2013	30-05-2015	1	11	25
SELVAM COLLEGE OF TECHNOLOGY	OTHERS - LECTURER	03-06-2010	01-05-2011	0	10	29
SELVAM COLLEGE OF TECHNOLOGY	ASSOCIATE PROFESSOR	02-05-2011	09-03-2013	1	10	8
			Total	5	9	27

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the Degree & Course	B.E.-ELECTRONICS AND COMMUNICATION ENGINEERING
Name of the faculty member	MS. KANIMOZHI V
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	5/236, NALLURPALAYAM, VADAMBACHERI POST, SULUR TK,
Line 2	COIMBATORE, 641669
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9585664994
Email	KANIVARATHARAJ27@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	EZBPK3204A
Passport Number	
Aadhar Number	869200993367
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7503084504
Date of Birth	30-05-1992
Age	29

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRONICS AND COMMUNICATION ENGINEERING	2013	TAMILNADU COLLEGE OF ENGINEERING	ANNA UNIVERSITY	8.87	DISTINCTION	
P.G.	M.E.	VLSI DESIGN	2015	KIT - KALAIGNARKARUNANIDHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	8.82	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-01-2020	29-01-2021	1	0	20
			Total	1	0	20

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	SCIENCE AND HUMANITIES
Name of the Degree & Course	S&H-ENGLISH
Name of the faculty member	MR. RAJTHILAK T
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	7/39 A,MUTHU NAGAR , SOMANUR
Line 2	COIMBATORE 641668
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 8015642859
Email	RAJTHILAK2013@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	CFCPR4873R
Passport Number	
Aadhar Number	961965504054
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7499934338
Date of Birth	24-06-1994
Age	27
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.A.	ENGLISH	2014	OTHERS - RVS ARTS COLLEGE	BHARATHIYAR UNIVERSITY	50	OTHERS - THIRD	
P.G.	OTHERS - M.A. WITH CA	OTHERS - ENGLISH	2017	OTHERS - GRD SCIENCE COLLEGE	BHARATHIYAR UNIVERSITY	70	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
OTHERS - PARKS ARTS COLLEGE	ASSISTANT PROFESSOR	21-07-2017	01-05-2018	0	9	12
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	02-01-2020	05-02-2021	1	1	4
			Total	1	10	21

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	CIVIL ENGINEERING
Name of the Degree & Course	B.E.-CIVIL ENGINEERING
Name of the faculty member	MS. SHERLIN SIBITHA G A
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	2/45A, SHALOM, MADATHIVILLAI, MANKAD
Line 2	KANYAKUMARI-629172
District	KANYAKUMARI
Telephone number	-
Mobile number	+91 - 9487252399
Email	SHERLINSIBITHAGA@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	FDGPS6872E
Passport Number	
Aadhar Number	768592400367
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7503306670
Date of Birth	12-11-1995
Age	26

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	CIVIL ENGINEERING	2017	UNIVERSITY COLLEGE OF ENGINEERING NAGERCOIL	ANNA UNIVERSITY	7.52	FIRST CLASS	
P.G.	M.E.	STRUCTURAL ENGINEERING	2019	KAMARAJ COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	8.66	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION
Score :
File :

II. Title of Ph.D. Thesis	
III. Faculty in which Ph.D. was awarded	
IV. Academic Experience : **(Start from the Current working Experience) ***	

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	02-07-2019	04-02-2021	1	7	3
			Total	1	7	6

V. Industrial Experience :	

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :
Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.
Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	CIVIL ENGINEERING
Name of the Degree & Course	M.E.-STRUCTURAL ENGINEERING
Name of the faculty member	MS. RAJASREE AS
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	350/F-21, SRIHARI ILLAM, MASTER PLAN COMPLEX ROAD ITI WEST
Line 2	THENI, 625531
District	THENI
Telephone number	-
Mobile number	+91 - 7094329003
Email	SREESARAVANANCE1@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	DSHPR8098R
Passport Number	
Aadhar Number	856108640436
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7503445967
Date of Birth	25-06-1996
Age	25

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	CIVIL ENGINEERING	2017	RAMCO INSTITUTE OF TECHNOLOGY	ANNA UNIVERSITY	7.73	FIRST CLASS	
P.G.	M.E.	STRUCTURAL ENGINEERING	2019	MEPCO SCHLENK ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	8.96	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	02-07-2019	04-02-2021	1	7	3
			Total	1	7	6

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	SCIENCE AND HUMANITIES
Name of the Degree & Course	S&H-MATHEMATICS
Name of the faculty member	MRS. RUBY SHARMILA C
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	PLOT NO 120 MUTHU NAGAR, OPPOSITE TO KPR MILLS, NEAR CHENNIANDAVAR KOVIL, KARUMATHAMPATTY
Line 2	COIMBATORE, 641659
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9486113074
Email	SHARMI.RUBY2011@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	CBQPR4450Q
Passport Number	
Aadhar Number	744248091597
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	4208155791
Date of Birth	12-12-1986
Age	35

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.SC.	OTHERS - MATHEMATICS WITH COMPUTER APPLICATIONS	2007	OTHERS - VELLALAR COLLEGE FOR WOMEN	BHARATHIYAR UNIVERSITY	82	DISTINCTION	
P.G.	M.SC.	OTHERS - MATHEMATICS WITH COMPUTER APPLICATIONS	2009	OTHERS - BHARATHIAR UNIVERSITY	BHARATHIYAR UNIVERSITY	81	DISTINCTION	
OTHERS - M PHIL	OTHERS - M PHIL	OTHERS - MATHEMATICS	2011	OTHERS - BHARATHIAR UNIVERSITY	BHARATHIYAR UNIVERSITY	65	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	25-06-2018	05-02-2021	2	7	11
TEJAA SHAKTHI INSTITUTE OF TECHNOLOGY FOR WOMEN	ASSISTANT PROFESSOR	20-04-2016	31-05-2018	2	1	11
MAHENDRA COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-06-2011	31-12-2015	4	6	30
			Total	9	3	24

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
14				

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	SCIENCE AND HUMANITIES
Name of the Degree & Course	B.E.-GENERAL ENGINEERING
Name of the faculty member	MR. ARUN KUMAR V
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	4/19,MOLAKALIPALAYAM,KADUVETTIPALYAM
Line 2	COIMBATORE,641659
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9629255857
Email	ARUNCSE006@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	BBPPA0095Q
Passport Number	
Aadhar Number	992747767205
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7500789208
Date of Birth	06-06-1989
Age	32

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	COMPUTER SCIENCE AND ENGINEERING	2010	PARK COLLEGE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	72	FIRST CLASS	
P.G.	M.E.	COMPUTER SCIENCE AND ENGINEERING	2013	SASURIE COLLEGE OF ENGINEERING	ANNA UNIVERSITY	7.49	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
PARK COLLEGE OF ENGINEERING AND TECHNOLOGY	ASSISTANT PROFESSOR	15-05-2013	11-06-2015	2	0	28
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	02-01-2020	05-02-2021	1	1	4
			Total	3	2	2

V. Industrial Experience :

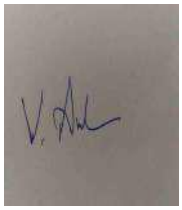
Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	CIVIL ENGINEERING
Name of the Degree & Course	B.E.-CIVIL ENGINEERING
Name of the faculty member	MS. KEERTHANA R
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	2/242, KALLAPURAM ELUR, O.K. MANDAPAM
Line 2	COIMBATORE,641032
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9843254393
Email	KEERTHANACE12@GMAIL.COM
Gender	FEMALE
Community	BC
PAN Number	DOWPK1515P
Passport Number	
Aadhar Number	771091853834
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	7503306664
Date of Birth	12-10-1995
Age	26

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	CIVIL ENGINEERING	2017	S V S COLLEGE OF ENGINEERING	ANNA UNIVERSITY	7.83	FIRST CLASS	
P.G.	M.E.	STRUCTURAL ENGINEERING	2019	DR MAHALINGAM COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	8.90	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	02-01-2020	04-02-2021	1	1	3
			Total	1	1	3

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	SCIENCE AND HUMANITIES
Name of the Degree & Course	B.E.-GENERAL ENGINEERING
Name of the faculty member	MR. SAKTHIVEL P
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	3/114, BEHIND POST OFFICE, B.THURINJIPATTI
Line 2	PAPPIREDDIPATTI, 635301
District	DHARMAPURI
Telephone number	-
Mobile number	+91 - 8428324644
Email	SLNTSAKTHI@GMAIL.COM
Gender	MALE
Community	MBC
PAN Number	IOGPS9635H
Passport Number	
Aadhar Number	494038232024
Faculty code given by C.O.E.	7142264
Faculty code given by A.I.C.T.E.	7500946700
Date of Birth	13-07-1993
Age	28
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	ELECTRICAL AND ELECTRONICS ENGINEERING	2014	SHREENIVASA ENGINEERING COLLEGE	ANNA UNIVERSITY	Y	FIRST CLASS	
P.G.	M.E.	POWER ELECTRONICS AND DRIVES	2016	GOVERNMENT COLLEGE OF ENGINEERING SALEM (AUTONOMOUS)	ANNA UNIVERSITY	Y	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	05-07-2019	05-02-2021	1	7	1
			Total	1	7	4

V. Industrial Experience :

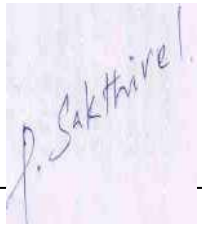
Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : 

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MECHANICAL ENGINEERING
Name of the Degree & Course	B.E.-MECHANICAL ENGINEERING
Name of the faculty member	MR. MANIVANNAN R
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	2/112 THADAGAM ROAD, SOMAIYANUR
Line 2	COIMBATORE, 641108
District	COIMBATORE
Telephone number	-
Mobile number	+91 - 9150639424
Email	MANIVANNANRANGANATHAN10@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	BVKPM7941N
Passport Number	
Aadhar Number	351879248523
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	4210194824
Date of Birth	23-12-1994
Age	27

I. Particulars of Educational Qualification : (only completed)

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2016	UNITED INSTITUTE OF TECHNOLOGY	ANNA UNIVERSITY	7.96	FIRST CLASS	
P.G.	M.E.	MANUFACTURING ENGINEERING	2018	SRI RAMAKRISHNA ENGINEERING COLLEGE (AUTONOMOUS)	ANNA UNIVERSITY	9.16	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :

File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	27-06-2018	29-01-2021	2	7	3
			Total	2	7	6

V. Industrial Experience :

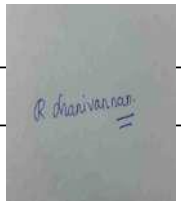
Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.



Signature of the Faculty :

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MECHANICAL ENGINEERING
Name of the Degree & Course	B.E.-MECHANICAL ENGINEERING
Name of the faculty member	MR. PRABHU T
Regular Or Adjunct	Regular
Image	
Present Designation	ASSISTANT PROFESSOR
Residential Address Line 1	2/23 SS NAGAR, SECOND STREET, KONGU MAIN ROAD
Line 2	TIRUPPUR, 641607
District	TIRUPPUR
Telephone number	-
Mobile number	+91 - 9944222793
Email	PRABHU.T34@GMAIL.COM
Gender	MALE
Community	MBC
PAN Number	BKCPP2797Q
Passport Number	
Aadhar Number	562364571177
Faculty code given by C.O.E.	7324259
Faculty code given by A.I.C.T.E.	4217278814
Date of Birth	13-11-1987
Age	34
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	2009	MAHARAJA PRITHVI ENGINEERING COLLEGE	ANNA UNIVERSITY	7.0	FIRST CLASS	
P.G.	M.E.	MANUFACTURING ENGINEERING	2015	SRI SUBRAMANYA COLLEGE OF ENGINEERING AND TECHNOLOGY	ANNA UNIVERSITY	7.1	FIRST CLASS	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION

Score :
File :

II. Title of Ph.D. Thesis

III. Faculty in which Ph.D. was awarded

IV. Academic Experience :

(Start from the Current working Experience) *

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	29-06-2018	29-01-2021	2	7	1
ANGEL COLLEGE OF ENGINEERING AND TECHNOLOGY	ASSISTANT PROFESSOR	10-08-2017	28-06-2018	0	10	19
SASURIE COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	02-09-2015	06-06-2017	1	9	5
			Total	5	2	28

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days
RAJSRIYA AUTOMOTIVE INDUSTRIES PRIVATE LIMITED	QUALITY CONTROLLER	INSPECTION	04-05-2009	28-05-2010	1	0	25
				Total	1	0	25

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty : _____

Name of the College	7142 - TAMILNADU COLLEGE OF ENGINEERING
Name of the Department	MECHANICAL ENGINEERING
Name of the Degree & Course	B.E.-MECHANICAL ENGINEERING
Name of the faculty member	MR. ELANGO C
Regular Or Adjunct	Regular
Image	
Present Designation	OTHERS - ASSISTANT PROFESSOR SENIOR SCALE II
Residential Address Line 1	4/156, KAMATCHIAMMAN KOVIL STREET, MEKKUR
Line 2	VIJAYAMANGALAM, PERUNDURAI TK, ERODE DT - 638056
District	ERODE
Telephone number	-
Mobile number	+91 - 9942522682
Email	ELANGO284@GMAIL.COM
Gender	MALE
Community	BC
PAN Number	AAHPE2558E
Passport Number	
Aadhar Number	393223665117
Faculty code given by C.O.E.	
Faculty code given by A.I.C.T.E.	436324935
Date of Birth	04-05-1971
Age	50
I. Particulars of Educational Qualification : (only completed)	

Category	Name of the Degree	Specialization	Year of Passing	Name of the College	Name of the University	% of Marks / Grades obtained / Ph.D. Awarded (Y/N)	Class obtained	Certificate
U.G.	B.E.	MECHANICAL ENGINEERING	1992	INSTITUTE OF ROAD AND TRANSPORT TECHNOLOGY	BHARATHIYAR UNIVERSITY	74.1	FIRST CLASS	
P.G.	M.E.	INDUSTRIAL ENGINEERING	2008	P S G COLLEGE OF TECHNOLOGY (AUTONOMOUS)	ANNA UNIVERSITY	9.27	DISTINCTION	

* Upload Scanned copy of Original Degree Certificate.

I.a. Additional Qualification :- NO ADDITIONAL QUALIFICATION
Score :
File :

II. Title of Ph.D. Thesis	
III. Faculty in which Ph.D. was awarded	
IV. Academic Experience : **(Start from the Current working Experience) ***	

Name of the College	Designation	Joining Date	Relieving Date / Current Date for Presently Working Institutions	Experience		
				Years	Months	Days
MAHARAJA ENGINEERING COLLEGE	OTHERS - LECTURER	27-11-2000	09-08-2001	0	8	13
TAMILNADU COLLEGE OF ENGINEERING	OTHERS - SENIOR LECTURER	11-09-2008	31-05-2011	2	8	20
SASURIE COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	10-08-2001	14-06-2008	6	10	5
OTHERS - ERODE INSTITUTE OF TECHNOLOGY	OTHERS - LECTURER	04-12-1995	24-11-2000	4	11	21
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-08-2011	31-05-2013	1	9	31
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-06-2013	29-01-2021	7	7	29
TAMILNADU COLLEGE OF ENGINEERING	ASSISTANT PROFESSOR	01-06-2011	31-07-2011	0	1	30
			Total	24	11	6

V. Industrial Experience :

Name of the Organisation	Designation	Nature of Work	Joining Date	Relieving Date	Experience		
					Years	Months	Days

VI. C.O.E. Appointment Experience :

Capacity at which service is extended for the conduct of Exmination during the last year

AUR (No. of days)	Squad Member (No. of days)	External Examiner (Practical) (No. of days)	Central Evaluation (No. of scripts Evaluated)	Re-Evaluation (No. of scripts Evaluated)
		4	500	200

It is certified that all the information provided are true to the best of my knowledge.

Signature of the Faculty :

9. Fee

Details of Fee, as approved by State Fee Committee, for the Institution

GQ- Rs.50,000/-Per Year

MQ.Rs.85,000/-Per Year

Time schedule for payment of Fee for the entire Programme

One month from the date of reopening for the corresponding academic year.

No. of Fee waivers granted with amount and name of students

Name of students	No. of Fee waivers granted	Fee waivers granted with amount
Nil		

Number of scholarship offered by the Institution, duration and amount

S.No	Number of scholarship offered by the Institution	Duration	amount
1	State Government Scholarship 1-Backward Welfare 2-Post Matric Scholarship	Every year	BC/MBC/DNC students only for Maintenance Fee SC/ST Students – Tuition fee and Maintenance Fee

Criteria for Fee waivers/scholarship

BC/MBC/DNC- Parents Income below Rs.2.0 Lakhs, through counseling

SC/ST - Parents Income Rs.2.5 Lakhs, through counseling

Estimated cost of boarding andLodging in Hostels

Room Rent : Rs. 20,000/- Per year

Boarding charges Rs.30,000/- per year (Dividing System)

Any other fee please specify- Nil

10.Admission

Number of seats sanctioned with the year of approval

S.NO	COURSES	2019-2020	2020-2021	2021-2022
1	**B.E(AUTO)**	60	30	30
2	**B.E(CIVIL)**	60	30	30
3	**B.E(CSE)**	60	60	60
4	**B.E(EEE)**	60	30	30
5	**B.E(ECE)**	60	60	60
6	**B.E(MECH)**	90	60	60
7	**B.E(ICE)**	60	30	30
	TOTAL	450	300	300
8	MBA	30	30	30
9	ME(Structural Engg)	18	18	18
10	ME(Computer Science)	9	9	9

Number of Students Admitted under Various Categories each year in the last Three years

S.NO	COURSES	2019-2020	2020-2021	2021-2022
1	**B.E(AUTO)**	6	3	8
	B.E(CIVIL)	3	4	14
	B.E(CSE)	13	49	56
	B.E(EEE)	5	4	19
	B.E(ECE)	9	18	45
	B.E(MECH)	6	9	20
	B.E(ICE)	4	11	20
	TOTAL	46	98	182
2	MBA	4	11	10
3	ME(Structural Engg)	4	4	12
4	ME(Computer Science)	0	1	4

Number of applications received during last two years for admission under Management Quota and number admitted

S.No.	Academic Year	Application Received	Admitted
1	2021-2022	100	67
2	2020-2021	32	21

S.No.	Academic Year	UG	LATERAL	PG	TOTAL
1	2021-2022	36	7	24	67
2	2020-2021	7 (GQ LAPS)	1	13	21

11. Admission Procedure

Mention the admission test being followed, name and address of the Test Agency/State Admission Authorities and its URL (website)

For the management quota the admission test being followed by the **Consortium (**Association of Management of Coimbatore Anna University Affiliated Colleges)

Name And Address Of The Test Agency

Association of Management of Coimbatore Anna University Affiliated Colleges

119, Bhavani Road,
Erode - 638 004.

Ph:0424-2293628, 728

Consortium Office:

Site No:18, SF No.586,
1st Part, SS Avenue, (Behind Millennium Motors) Avinashi Road,
Coimbatore 641 014.
Ph: 0422 2625165
Fax: 0422 2625178
email: **coordinator@coimbatoreassociation.com**

Website:http://www.coimbatoreassociation.com/contact.html

For Government Quota Anna University Counselling

https://cac.annauniv.edu/

Number of seats allotted to different Test Qualified candidate separately (AIEEE/ CET (State conducted test/ University tests/ CMAT/ GPAT)/ Association conducted test etc.)

- last year all the seats were surrendered and filled through single window system.

Calendar for admission against Management/vacant seats:

Last date of request for applications - 16.08.2021

Last date of submission of applications -21.09.2021

Dates for announcing final results – 28.09.2021

Release of admission list (Main list and waiting list shall be announced on the same date)

UG	:	15/10/2021
PG (MBA & ME)	:	20/10/2021

Date of acceptance by the candidate (Time given shall in no case be less than 15 days)

UG	:	30/10/2021
PG	:	04/11/2021

Last date for closing of admission – 01.11.2021

Starting of the Academic session

The academic session for B.E., M.E., and MBA, commences on the month of JUNE and ends byDECEMBER.

The waiting list shall be activated only on the expiry of date of main list.

NIL

The Policy of refund of the fee, in Case of Withdrawal shall be Clearly Notified

The Refund Policy Fees will be based on AICTE Regulation

12. Criteria and Weightages for Admission

Describe each criteria with its respective weightages i.e., Admission test, marks in qualifying examination,etc

S.No	Rollno Number	Name	MARKS (out of 600)
CSE			
1.	21CS01	ABISHEAK M	535
2.	21CS02	ABIVARSHA K	525
3.	21CS03	AKSHAYA SRI S	544
4.	21CS04	ANBU RAJA R	496
5.	21CS05	ATHIGANESAN K	526
6.	21CS06	AZARIA J WESLEY	570
7.	21CS07	BALA MOORTHY	467
8.	21CS08	BAVAN KUMAR V	542
9.	21CS09	DEENATHAYAN M K	434
10.	21CS10	DHULASILINKAM S	469
11.	21CS11	DIVYA M	510
12.	21CS12	DIWAHAR S	543
13.	21CS13	GOBINATH S	527
14.	21CS14	GOKUL RAJ R	540
15.	21CS15	GUNASEELAN S	453
16.	21CS16	HARISH R	511
17.	21CS17	ISRUTHI ABINAYA M	485
18.	21CS18	JEEVAKUMAR R	509
19.	21CS19	KABILESH A	510
20.	21CS20	KARUPPUSAMY G	290
21.	21CS21	KAVIPRIYA S	374
22.	21CS22	MAHALAKSHMI P	501
23.	21CS23	MANEESH C	512
24.	21CS24	MINIBALA G	522
25.	21CS25	MITHUN RAJ J	522
26.	21CS26	MOHAMED FAIZUL R	515
27.	21CS27	MURUGESH M	530
28.	21CS28	MUTHUKUMAR S	516
29.	21CS29	MUTHUSELVAM P	508
30.	21CS30	NAVEEN C	436/500
31.	21CS31	NAZIRA I	509
32.	21CS32	PAVITHRA V	488
33.	21CS33	POOJA A	526
34.	21CS34	RAGANITHI S	409
35.	21CS35	RAKUL A	362/500
36.	21CS36	RAHUL SARATH A	551
37.	21CS37	RAJAMANI N	421
38.	21CS38	RAKSHA S	516
39.	21CS39	RAVIBHARATHI G	499
40.	21CS40	RAVIKUMAR S	512
41.	21CS41	RUGESWARAN C	504
42.	21CS42	SANKARI A	525

43.	21CS43	SANTHOSH V	536
44.	21CS44	SAVITHA J	543
45.	21CS45	SINEGA E	533
46.	21CS46	SNEHA M R	546
47.	21CS47	SRI PARTHASARATHI P	561
48.	21CS48	SRIGANESH T	514
49.	21CS49	SURIYA MOORTHI S	467
50.	21CS50	SUSHMA A	313
51.	21CS51	SUSHMITHA S P	513
52.	21CS52	THANVEER S	508
53.	21CS53	VALLINAYAGAM N	519
54.	21CS54	VEERAMANI P	433
55.	21CS56	VENKADESH K	502

		AUTO	
1	21AU01	AADHI S	488
2	21AU02	DHARANIDARAN K	515
3	21AU03	DISON JOSEPH L	466
4	21AU04	GOKULKANNAN K	493
5	21AU05	MUTHUKUMARAN S	397
6	21AU06	SANJAI R	480
7	21AU07	SRIRAM B	414
8	21AU08	VENKATESH S	516
		MECH	
1.	21ME01	BHARANI SHREE M	487
2.	21ME02	DEEPAK S	516
3.	21ME03	DHAYANANTHA R	470
4.	21ME04	DHINESH KUMAR P	439
5.	21ME05	DINESH KUMAR S	304
6.	21ME06	DIWAHAR S	415
7.	21ME07	JAIRAJESH P	538
8.	21ME08	JANARTHANAN R	438
9.	21ME09	JOSHWA K	425
10.	21ME10	KALAIYARASAN V	390
11.	21ME11	POOVIN R	500
12.	21ME12	PRADEEP K	469
13.	21ME13	PRAVINKUMAR P	504
14.	21ME14	REAGIS S	495
15.	21ME15	SANJAY S	461
16.	21ME16	SIVAKUMAR V	243
17.	21ME17	SUGANTHAN T	491
18.	21ME18	VIMALRAJ S	449
19.	21ME19	YOGADARSHAN T S	475
20.	21ME20	YUVARAJ P	454
		CIVIL	
1	21CEO1	AADHI A	415
2	21CEO2	AJAY KUMAR K	523
3	21CEO3	BALAMURALI S	472

4	21CEO4	BHARANIDHARAN K	501
5	21CEO5	HARISHKANNAN N	526
6	21CEO6	LAKSHMANAN K	477
7	21CEO7	MANIKANDAN V	483
8	21CEO8	MANOJKUMAR S	505
9	21CEO9	MANOJKUMAR S	402
10	21CEO10	PORPANAISELVAN P	491
11	21CEO11	RAVIKUMAR K	441
12	21CEO12	SRI GAYATRI	453
13	21CEO13	SUGUMARAN T	467
14	21CEO14	SURESH GOPI K	432
		ECE	
56.	21EC01	ABDUL MATHEEN N	482
57.	21EC02	ABINAYA A	544
58.	21EC03	ARUNKUMAR A	466
59.	21EC04	ARUNKUMAR S	488
60.	21EC05	BASKAR P	505
61.	21EC06	DEENADHAYALAN B	532
62.	21EC07	DHAYANITHI G	524
63.	21EC08	EVANJALIN SILPU P	480
64.	21EC09	HARI PRASATH S	506
65.	21EC10	HARISH D	503
66.	21EC11	HARISH G	544
67.	21EC12	JEMILIN JUNET J	526
68.	21EC13	KALAIMUTHAMIZHAN M	484
69.	21EC14	KALAIYARASAN K	503
70.	21EC15	KAMALI M	395
71.	21EC16	KARAN K	491
72.	21EC17	KARTHICK M	473
73.	21EC18	KEERTHIKA J	502
74.	21EC19	KUBENDIRAN M	510
75.	21EC20	LINGESHWARAN M	458
76.	21EC21	MADHUSRI M	522
77.	21EC22	MANIKANDAN B	504
78.	21EC23	MANIYARASU B	522
79.	21EC24	MATHAN S	450
80.	21EC25	MATHAVAN M	519
81.	21EC26	MUTHUMARIAPPAN V	481
82.	21EC27	NATHEESH R	499
83.	21EC28	PARAMASIVAN T	554
84.	21EC29	PARTHASARATHY T	513
85.	21EC30	PAVITHRAN S	503
86.	21EC31	PRASANNA K M	347
87.	21EC32	RAHUL K	494
88.	21EC33	RAJESHKANNAN S	518
89.	21EC34	REVATHI E	522
90.	21EC35	ROHITVARSHAN H	515

91.	21EC36	SADHICK S	459
92.	21EC37	SANGAMESHWAR S	530
93.	21EC38	SANTHOSH M	431
94.	21EC39	SANTHOSH S	524
95.	21EC40	SHIBIN G	518
96.	21EC41	SIVAASH R	476
97.	21EC42	SWATHI R	479
98.	21EC43	TAMIL SELVAN T	515
99.	21EC44	VIKRAM L	497
100.	21EC45	VIVETHA N	514
		ICE	
1.	21IC01	ANNAMALAI M	434
2.	21IC02	ARTHI M	494
3.	21IC03	DHANUSHKUMAR V	476
4.	21IC04	GLAIYATHSAN J	459
5.	21IC05	GNANA PRATHISA D	525
6.	21IC06	GOKULAKRISHNAN M	437
7.	21IC07	KALPANA S	517
8.	21IC08	KAVIARASI A	497
9.	21IC09	MAHALAKSHMI J	471
10.	21IC10	NAVEEN L	495
11.	21IC11	PRAVEEN S	410
12.	21IC12	RAJKUMAR R	469
13.	21IC13	RAMPRAKASH R	483
14.	21IC14	RESHIBALA S B	544
15.	21IC15	SANTHOSH J	486
16.	21IC16	SNEKA S	445
17.	21IC17	THAUFIK J	507
18.	21IC18	UMAR M	416
19.	21IC19	VARUN KUMAR R	486
20.	21IC20	VIGNESHWARAN R	445
		EEE	
1.	21EE01	AHAZ SAM BENKAR T	482
2.	21EE02	ARAVIND A	463
3.	21EE03	ASWIN S	488
4.	21EE04	CHANDRAMOULI S	475
5.	21EE05	DHARNESH G	408
6.	21EE06	GOWTHAM M	459
7.	21EE07	HARIKRISHNAN T	508
8.	21EE08	JEEVA T	438
9.	21EE09	KAMALESH G	476
10.	21EE10	KRISHNAVEL D	526
11.	21EE11	MANISHA A	485
12.	21EE12	PRATHAPRAJ S	510
13.	21EE13	PRIYADHARSHINI P	489
14.	21EE14	SEBASTIN P	510
15.	21EE15	SELVANATHAN S	474

16.	21EE16	SHARMILA G	542
17.	21EE17	THAVASAKTHI M	418
18.	21EE18	VIGNESHWARAN S	475
19.	21EE19	VINOTHKUMAR K	467

Mention the minimum level of acceptance, if any

B.E (regular) course:

A pass at 10+2 or equivalent with a minimum aggregate of 50% marks with physics, chemistry and biology as compulsory subjects.

B.E (lateral entry) course:

Diploma course in the relevant discipline with 50% marks (45% for SC/ST/PH) from a recognized institution like DOTE.

M.E course:

B.E/B.Tech in the relevant discipline with 50% marks (45% for SC/ST/PH) from a recognized university (or)

Diploma with AMIE degree along with two years of work experience are also eligible.

MBA course:

Any bachelor's degree with 50 % marks (45% for SC/ST/PH) from a recognized university.

Mention the Cut – off levels of percentage and percent ilescore of the candidates in the admission test for the last three years

I year – BE- 2020-21

A pass in the HSC (Academic : both +1 and +12)

S.No	Community	Minimum average marks in Mathematics, physics and chemistry put together
1	General Category	45.00%
2	Backward class including Backward class Muslim	40.00%
3	MBC & DNC	40.00%
4	SC/SCA/ST	40.00%

A pass in any one of the HSC (Vocational Subject : both +1 and +12)

S.No	Community	Minimum average marks in Related subjects, Vocational Theory and Practicals together
1	General Category	45.00%
2	Backward class including Backward class Muslim	40.00%

3	MBC & DNC	40.00%
4	SC/SCA/ST	40.00%

Lateral Entry

Programme	**Communal Category**	**Eligibility Minimum Marks in Relevant subjects – average %**
Engineering and Technology First year B.E / B.Tech UG Degree Courses (4 years duration)	OC	45%
	All other reserved categories BC/MBC/SC/St	40%

Passed Diploma examination with at least 45% marks (40% marks in case of candidate belonging to reserved category) in any branch of Engineering and Techonology.

PG Courses

S.No	**Course**	**Eligibility**
1	M.B.A	A pass in a recognised Bachelor's Degree of minimum 3 years duration and obtained at least 50% (45% in the case of candidate belonging to reserved category) in the qualifying degree examination. (a) 10+2+3/4/5 years pattern Or (b) 10+3 years Diploma +3 years pattern Or (c) B.E / B.Tech / B.Arch / B.Pharm Or (d) (i) 10+ 2 + AMIE * Or (ii) 10 + 3 years diploma (awarded by the state Board of Technical Education) + AMIE
2	M.E. / M.Tech./ M.Arch. / M.Plan	(a) A pass in a recognised Bachelor's Degree of minimum 3 years duration and obtained at least 50% (45% in the case of candidate belonging to reserved category) in the qualifying degree examination. (a) B.E. / B.Tech. / B.Arch. Degree programmes Or (b) B.Pharm. Degree programmes Or (c) Master's Degree in the relevant branch of science / Arts, which are prescribed. (b) (a)10 + 2 + AMIE*

		Or (b) 10 + 3 years diploma (awarded by the state Board of Technical Education) + AMIE.*

Display marks scored in test etc., and in aggregate for all candidates who were admitted

S.No	Name of the student	Branch	UG / PG	Percentage scored	MQ
1.	MUTHUKUMARAN S	AUTO	UG	73.33	MQ
2.	SRI GAYATHRI S	CIVIL	UG	67.33	MQ
3.	SURESH GOPI K	CIVIL	UG	71.67	MQ
4.	ABISHEK M	CSE	UG	87	MQ
5.	BALAMOORTHY S	CSE	UG	76.67	MQ
6.	DHULASILINGAM S	CSE	UG	76.33	MQ
7.	DIVYA M	CSE	UG	83.33	MQ
8.	GUNASEELAN S	CSE	UG	73	MQ
9.	HARISH R	CSE	UG	84.33	MQ
10.	JEEVAKUMAR	CSE	UG	84.33	MQ
11.	KAVIPRIYA S	CSE	UG	51	MQ
12.	MINIBALA G	CSE	UG	84.33	MQ
13.	MUTHUSELVAM P	CSE	UG	82.67	MQ
14.	PAVITHRA V	CSE	UG	81	MQ
15.	RAGANITHI S	CSE	UG	68.33	MQ
16.	RAJAMANI	CSE	UG	86.67	MQ
17.	RAKUL A	CSE	UG	67.33	MQ
18.	RAVIBHARATHI G	CSE	UG	82.33	MQ
19.	RAVIKUMAR S	CSE	UG	83	MQ
20.	SANTHOSH V	CSE	UG	88.67	MQ
21.	SURYAMOORTHY S	CSE	UG	75.33	MQ
22.	THANVEER S	CSE	UG	81.67	MQ
23.	VALLINAYAGAM N	CSE	UG	85.33	MQ
24.	VEERAMANI P	CSE	UG	71	MQ
25.	EVANJALIN SILPU P	ECE	UG	77.67	MQ
26.	KALAIYARASAN K	ECE	UG	80	MQ
27.	MANIYARASU	ECE	UG	86.33	MQ
28.	MUTHUMARIYAPPAN V	ECE	UG	78.67	MQ
29.	SANTHOSH M	ECE	UG	71.33	MQ
30.	GOWTHAM M	EEE	UG	81	MQ
31.	THAVASAKTHI M	EEE	UG	68.33	MQ
32.	GNANA PRATHISA D	ICE	UG	86.67	MQ
33.	MAHALAKSHMI J	ICE	UG	76.67	MQ
34.	THAUFIK J	ICE	UG	81.33	MQ
35.	UMAR M	ICE	UG	68	MQ
36.	VIGNESHWARAN R	ICE	UG	72.33	MQ
37.	REAGIS S	MECH	UG	77.67	MQ

13. List of Applicants

List of candidates whose applications have been reveived along with percentile percentages core for each of the qualifying examination in separate categories for open seats. List of candidate who have applied along with percentage and percentile score for Management quota seats (merit wise)

S.NO	ROLL NO	NAME	CATEGORY	PERCENTAGE	COUNSELLING / MANAGEMENT
AUTO					
1	21AU01	AADHI S	BC	80	counselling
2	21AU02	DHARANIDARAN K	MBC	82.67	counselling
3	21AU03	DISON JOSEPH L	BC	77.33	counselling
4	21AU04	GOKULKANNAN K	BC	80.67	counselling
5	21AU05	MUTHUKUMARAN S	MBC	73.33	Management
6	21AU06	SANJAI R	OC	78	counselling
7	21AU07	SRIRAM B	MBCDNC	69.33	counselling
8	21AU08	VENKATESH S	MBCDNC	84.67	counselling
		CIVIL			
1	21CEO1	AADHI A	MBC	76.33	counselling
2	21CEO2	AJAY KUMAR K	BC	87	counselling
3	21CEO3	BALAMURALI S	SC	76.67	counselling
4	21CEO4	BHARANIDHARAN K	BC	82	counselling
5	21CEO5	HARISHKANNAN N	BC	86	counselling
6	21CEO6	LAKSHMANAN K	BC	78	counselling
7	21CEO7	MANIKANDAN V	MBCDNC	79.33	counselling
8	21CEO8	MANOJKUMAR S	MBCDNC	81.33	counselling
9	21CEO9	MANOJKUMAR S	MBCDNC	66	Counseling(7.5)
10	21CEO10	PORPANAISELVAN P	MBCDNC	81	counselling
11	21CEO11	RAVIKUMAR K	BC	72.67	counselling
12	21CEO12	SRI GAYATHRI S	SC	67.33	Management
13	21CEO13	SUGUMARAN T	BC	78	counselling
14	21CEO14	SURESH GOPI K	MBC	71.67	Management

		CSE			
1.	21CS01	ABISHEK M	BC	87	Management
2.	21CS02	ABIVARSHA K	BC	87.33	counselling
3.	21CS03	AKSHAYA SRI S	BC	88.33	counselling
4.	21CS04	ANBU RAJA R	SCA	81.67	counselling
5.	21CS05	ATHIGANESAN K	BC	87	counselling
6.	21CS06	AZARIA J WESLEY	BC	93.33	counselling
7.	21CS07	BALAMOORTHY S	BC	76.67	Management
8.	21CS08	BHAVAN KUMAR V	BC	91	counselling
9.	21CS09	DEENATHAYAN M K	SCA	79	counselling
10	21CS10	DHULASILINGAM S	BC	76.33	Management
11	21CS11	DIVYA M	MBC	83.33	Management
12	21CS12	DIWAHAR S	OC	89	counselling
13	21CS13	GOBINATH S	BC	86	counselling
14	21CS14	GOKUL RAJ R	BC	88.33	counselling
15	21CS15	GUNASEELAN S	MBC	73	Management
16	21CS16	HARISH R	SC	84.33	Management
17	21CS17	ISRUTHI ABINAYA M	BC	79.67	counselling
18	21CS18	JEEVAKUMAR	MBCDNC	84.33	Management
19	21CS19	KABILESH A	SCA	84.67	counselling
20	21CS20	KARUPPUSAMY G	BC	41.67	counselling
21	21CS21	KAVIPRIYA S	SC	51	Management
22	21CS22	MAHALAKSHMI P	SC	81	counselling
23	21CS23	MANEESH C	BC	83.67	counselling
24	21CS24	MINIBALA G	SC	84.33	Management
25	21CS25	MITHUN RAJ J	BCM	84.67	counselling
26	21CS26	MOHAMED FAIZUL R	BC	84	counselling
27	21CS27	MURUGESH M	SC	87.67	counselling
28	21CS28	MUTHUKUMAR S	BC	84.67	counselling
29	21CS29	MUTHUSELVAM P	BC	82.67	management
30	21CS30	NAVEEN C	BCM	86.33	counselling
31	21CS31	NAZIRA I	BC	85	counselling
32	21CS32	PAVITHRA V	BC	81	Management
33	21CS33	POOJA A	BC	87.33	counselling
34	21CS34	RAGANITHI S	SC	68.33	Management
35	21CS35	RAHUL SARATH A	MBC	89.67	counselling
36	21CS36	RAJAMANI	BC	86.67	Management
37	21CS37	RAKSHA S	SC	84.67	counselling
38	21CS38	RAKUL A	MBC	67.33	counselling
39	21CS39	RAVIBHARATHI G	BC	82.33	Management
40	21CS40	RAVIKUMAR S	MBCDNC	83	Management
41	21CS41	RUGESWARAN C	MBC/ DNC	82.67	counselling
42	21CS42	SANKARI A	BC	86	counselling
43	21CS43	SANTHOSH V	SC	88.67	Management

44	21CS44	SAVITHA J	MBCDNC	90.33	counselling
45	21CS45	SINEGA E	MBCV	86.67	counselling
46	21CS46	SNEHA M R	BC	90.67	counselling
47	21CS47	SRI PARTHASARATHI P	MBC	94.57	counselling
48	21CS48	SRIGANESH T	BC	85.33	counselling
49	21CS49	SURYAMOORTHY S	MBC	75.33	Management
50	21CS50	SUSHMA A	MBC(V)	42.67	counselling
51	21CS51	SUSHMITHA S P	MBCDNC	84	counselling
52	21CS52	THANVEER S	BCM	81.67	Management
53	21CS53	VALLINAYAGAM N	OC	85.33	Management
54	21CS54	VEERAMANI P	BC	71	Management
55	21CS56	VENKADESH K	BC	82	counselling
		ECE			
1.	21EC01	ABDUL MATHEEN N	BCM	78.67	counselling
2.	21EC02	ABINAYA A	MBC(V)	91	counselling
3.	21EC03	ARUNKUMAR A	MBCDNC	78	counselling
4.	21EC04	ARUNKUMAR S	BC	80.33	counselling
5.	21EC05	BASKAR P	MBCV	82.33	counselling
6.	21EC06	DEENADHAYALAN B	BC	84	counselling
7.	21EC07	DHAYANITHI G	BC	86.33	counselling
8.	21EC08	EVANJALIN SILPU P	BC	77.67	Management
9.	21EC09	HARI PRASATH S	BC	81.67	counselling
10.	21EC10	HARISH D	MBCV	83.33	counselling
11.	21EC11	HARISH G	BC	90.33	counselling
12.	21EC12	JEMILIN JUNET J	BC	86.67	counselling
13.	21EC13	KALAIMUTHAMIZHAN M	SC	79.67	counselling
14.	21EC14	KALAIYARASAN K	MBCV	80	Management
15.	21EC15	KAMALI M	SC	63.67	counselling
16.	21EC16	KARAN K	MBCV	80.33	counselling
17.	21EC17	KARTHICK M	MBCV	77.67	counselling
18.	21EC18	KEERTHIKA J	BC	82	counselling
19.	21EC19	KUBENDIRAN M	MBCV	82.67	counselling
20.	21EC20	LINGESHWARAN M	BC	76	counselling
21.	21EC21	MADHUSRI M	BC	87	counselling
22.	21EC22	MANIKANDAN B	BC	83	counselling
23.	21EC23	MANIYARASU	BC	86.33	Management
24.	21EC24	MATHAN S	SC	74.33	counselling
25.	21EC25	MATHAVAN M	MBC	86	counselling
26.	21EC26	MUTHUMARIYAPPAN V	BC	78.67	Management
27.	21EC27	NATHEESH R	MBCV	83.33	counselling
28.	21EC28	PARAMASIVAN T	MBCDNC	90.67	counselling
29.	21EC29	PARTHASARATHY T	BC	83.67	counselling
30.	21EC30	PAVITHRAN S	BC	83	counselling
31.	21EC31	PRASANNA K M	SC	58	counselling

32	21EC32	RAHUL K	BC	80.33	counselling
33	21EC33	RAJESHKANNAN S	BC	84	counselling
34	21EC34	REVATHI E	MBCV	84.67	counselling
35	21EC35	ROHITHVARSHAN H	BC	82.67	counselling
36	21EC36	SADHICK S	BCM	75.33	counselling
37	21EC37	SANGAMESHWAR S	BC	86	counselling
38	21EC38	SANTHOSH M	BC	71.33	Management
39	21EC39	SANTHOSH S	BC	88	counselling
40	21EC40	SHIBIN G	BC	84	counselling
41	21EC41	SIVAASH R	BC	78.67	counselling
42	21EC42	SWATHI R	MBCDNC	77	counselling
43	21EC43	TAMIL SELVAN T	MBCV	84	counselling
44	21EC44	VIKRAM L	BC	80.33	counselling
45	21EC45	VIVETHA N	MBCV	85	counselling
		EEE			
1	21EE01	AHAZ SAM BENKAR T	BC	78	counselling
2	21EE02	ARAVIND A	MBCV	76.33	counselling
3	21EE03	ASWIN S	BC	78.33	counselling
4	21EE04	CHANDRAMOULI S	MBCDNC	77	counselling
5	21EE05	DHARNESH G	MBCDNC	68.33	counselling
6	21EE06	GOWTHAM M	BC	81	Management
7	21EE07	HARIKRISHNAN T	SC	83	counselling
8	21EE08	JEEVA T	MBCV	58	counselling
9	21EE09	KAMALESH G	MBC	77.67	counselling
10	21EE10	KRISHNAVEL D	MBCDNC	86.33	counselling
11	21EE11	MANISHA A	MBCDNC	79	counselling
12	21EE12	PRATHAPRAJ S	BC	83.67	counselling
13	21EE13	PRIYADHARSHINI P	BC	81	counselling
14	21EE14	SEBASTIN P	BC	82	counselling
15	21EE15	SHARMILA G	BC	91	counselling
16	21EE16	SELVANATHAN S	MBC(V)	77.33	counselling
17	21EE17	THAVASAKTHI M	BC	68.33	Management
18	21EE18	VIGNESHWARAN S	BC	78.33	counselling
19	21EE19	VINOTHKUMAR K	BC	76.67	counselling
		ICE			counselling
1	21IC01	ANNAMALAI M	MBCV	75.33	counselling
2	21IC02	ARTHI M	BC	81.33	counselling
3	21IC03	DHANUSHKUMAR V	MBCDNC	77.67	counselling
4	21IC04	GLAIYATHSAN J	BC	81	counselling
5	21IC05	GNANA PRATHISA D	BC	86.67	Management
6	21IC06	GOKULAKRISHNAN M	BC	63.67	counselling
7	21IC07	KALPANA S	BC	85	counselling
8	21IC08	KAVIARASI A	BC	82	counselling
9	21IC09	MAHALAKSHMI J	SC	76.67	Management

10	21IC10	NAVEEN L	BC	80.67	counselling
11	21IC11	PRAVEEN S	MBCDNC	67.67	counselling
12	21IC12	RAJKUMAR R	BC	68.67	counselling
13	21IC13	RAMPRAKASH R	BC	79.67	counselling
14	21IC14	RESHIBALA S B	BC	89.67	counselling
15	21IC15	SANTHOSH J	BC	81.67	counselling
16	21IC16	SNEKA S	MBCV	70	counselling
17	21IC17	THAUFIK J	BCM	81.33	Management
18	21IC18	UMAR M	BCM	68	Management
19	21IC19	VARUN KUMAR R	BC	80.33	counselling
20	21IC20	VIGNESHWARAN R	SC	72.33	Management
		MECH			
1	21ME01	BHARANI SHREE M	MBCDNC	79	counselling
2	21ME02	DEEPAK S	BC	84.33	counselling
3	21ME03	DHAYANANTHA R	BC	75.33	counselling
4	21ME04	DHINESH KUMAR P	BC	72	counselling
5	21ME05	DINESH KUMAR S	BC	48	counselling
6	21ME06	DIWAHAR S	MBC	68.67	counselling
7	21ME07	JAIRAJESH P	ST	87.67	counselling
8	21ME08	JANARTHANAN R	BC	76.67	counselling
9	21ME09	JOSHWA K	BC	71	counselling
10	21ME10	KALAIYARASAN V	SC	64.33	counselling
11	21ME11	POOVIN R	BC	80	counselling
12	21ME12	PRADEEP K	BC	78.67	counselling
13	21ME13	PRAVINKUMAR P	BC	80.67	counselling
14	21ME14	REAGIS S	MBC	77.67	Management
15	21ME15	SANJAY S	MBCV	75.67	counselling
16	21ME16	SIVAKUMAR V	MBCV	42.33	counselling
17	21ME17	SUGANTHAN T	BC	81	counselling
18	21ME18	VIMALRAJ S	MBC	73.67	counselling
19	21ME19	YOGADARSHAN T S	BC	77.33	counselling
20	21ME20	YUVARAJ P	BC	74	counselling

Results of Admission under management seats / vacant seats

Composition of selection team for admission under management quota with the brief profile of members (This information be made available in thepublic domainafter the admission process is over)

The following professors are our college selection team for admission under management quota.

1.Dr.M.Karthikeyan M.E., Ph.D.,

Principal

Tamilnadu College of Engineering,

Karumathampatti

Coimbatore

Dr.G.Saravana Kumar M.E., Ph.D

Professor and Dean / EEE

22years of Teaching Experience and 3 years industry experience

Specialization of Process control and Adaptive control

Mail ID: eee@tnce.in

Dr. A.S.Shanthi M.E., Ph.D

Professor & HOD /S&H

18 year 4 months experience

Specialization of Data mining and Image Processing

Mail ID: snh-hod @tnce.in

Score of the individual candidate admitted arranged in order or merit

S.No	Name of the student	Branch	UG / PG	Percentage scored	MQ/LATERAL
1.	MUTHUKUMARAN S	AUTO	UG	73.33	MQ
2.	SRI GAYATHRI S	CIVIL	UG	67.33	MQ
3.	SURESH GOPI K	CIVIL	UG	71.67	MQ
4.	ABISHEK M	CSE	UG	87	MQ
5.	BALAMOORTHY S	CSE	UG	76.67	MQ
6.	DHULASILINGAM S	CSE	UG	76.33	MQ
7.	DIVYA M	CSE	UG	83.33	MQ

8.	GUNASEELAN S	CSE	UG	73	MQ
9.	HARISH R	CSE	UG	84.33	MQ
10.	JEEVAKUMAR	CSE	UG	84.33	MQ
11.	KAVIPRIYA S	CSE	UG	51	MQ
12.	MINIBALA G	CSE	UG	84.33	MQ
13.	MUTHUSELVAM P	CSE	UG	82.67	MQ
14.	PAVITHRA V	CSE	UG	81	MQ
15.	RAGANITHI S	CSE	UG	68.33	MQ
16.	RAJAMANI	CSE	UG	86.67	MQ
17.	RAKUL A	CSE	UG	67.33	MQ
18.	RAVIBHARATHI G	CSE	UG	82.33	MQ
19.	RAVIKUMAR S	CSE	UG	83	MQ
20.	SANTHOSH V	CSE	UG	88.67	MQ
21.	SURYAMOORTHY S	CSE	UG	75.33	MQ
22.	THANVEER S	CSE	UG	81.67	MQ
23.	VALLINAYAGAM N	CSE	UG	85.33	MQ
24.	VEERAMANI P	CSE	UG	71	MQ
25.	EVANJALIN SILPU P	ECE	UG	77.67	MQ
26.	KALAIYARASAN K	ECE	UG	80	MQ
27.	MANIYARASU	ECE	UG	86.33	MQ
28.	MUTHUMARIYAPPAN V	ECE	UG	78.67	MQ
29.	SANTHOSH M	ECE	UG	71.33	MQ
30.	GOWTHAM M	EEE	UG	81	MQ
31.	THAVASAKTHI M	EEE	UG	68.33	MQ
32.	GNANA PRATHISA D	ICE	UG	86.67	MQ
33.	MAHALAKSHMI J	ICE	UG	76.67	MQ
34.	THAUFIK J	ICE	UG	81.33	MQ
35.	UMAR M	ICE	UG	68	MQ
36.	VIGNESHWARAN R	ICE	UG	72.33	MQ
37.	REAGIS S	MECH	UG	77.67	MQ
PG					
2	SRI SHIVANI.S	MBA	PG	84%	MQ
3	HEMANTH KUMAR.S	MBA	PG	60%	MQ
4	SANJEEVI.R	MBA	PG	56%	MQ
5	MUHAMMED ARSHIN.K	MBA	PG	61%	MQ
6	ABHISHEK SANTHOSH	MBA	PG	61%	MQ
7	SHELLY SEBASTIAN	MBA	PG	55%	MQ
8	SHAMSAD.K.A	MBA	PG	61%	MQ
9	PRAVEEN N	MBA	PG	61%	MQ
10	BASIN S	M.E (SE)	PG	6.02	MQ

11	KARUPPUSAMY. V	M.E (SE)	PG	7.12	MQ
12	RAVIKUMAR. M	M.E (SE)	PG	7.34	MQ
13	SANKAR KUMAR. S	M.E (SE)	PG	6.86	MQ
14	SHAHANA FAROOQ.K	M.E (SE)	PG	7.99	MQ
15	SHAJEEH FASIL.T	M.E (SE)	PG	7.95	MQ
16	SIKKANDAR.M	M.E (SE)	PG	7.62	MQ
17	SIYAS	M.E (SE)	PG	7.35	MQ
18	TARIKH ANVAR.E	M.E (SE)	PG	7.07	MQ
19	THAMANNA.K.P	M.E (SE)	PG	7.87	MQ
20	THILAGAN.K.M	M.E (SE)	PG	7.86	MQ
21	VISHNU SANKAR.C.B	M.E (SE)	PG	7.76	MQ
22	MOHAMMED RAFEEQUE.K	ME(CSE)	PG	6.7	MQ
23	MIDHUN RAJ. K	ME(CSE)	PG	6.31	MQ
24	JASON. P	ME(CSE)	PG	7.82	MQ
	LATERAL				
1	LOGESHWARAN E	AUTO	UG	83.82	LATERAL
2	SABARI S	AUTO	UG	74.66	LATERAL
3	SUBRAMANIAN N	CIVIL	UG	76	LATERAL
4	MOHAMED MOHAIDEEN BADUSHA M	CIVIL	UG	68.91	LATERAL
5	AJMEER S	CIVIL	UG	67.91	LATERAL
6	SHAKTHI KUMARAN S	CSE	UG	74.3	LATERAL
7	VASANTH R	CSE	UG	71.05	LATERAL
8	VIGNESH G	CSE	UG	77.29	LATERAL
9	CHANDRU R	CSE	UG	82.14	LATERAL
10	SANTHOSHKUMAR M	CSE	UG	78.07	LATERAL
11	SURYA M	EEE	UG	79.2	LATERAL
12	MONISH P	EEE	UG	78.2	LATERAL
13	VIJAYAKUMAR M	EEE	UG	73.39	LATERAL
14	RAM KUMAR V	EEE	UG	66.68	LATERAL
15	THAVEEN M	EEE	UG	73.89	LATERAL
16	NAVEENKUMAR S	ICE	UG	74.43	LATERAL
17	SENTHAMILARASAN G	ICE	UG	70.14	LATERAL
18	ASWATH G	ICE	UG	73.11	LATERAL
19	CHATTANATHAN R	ICE	UG	72.32	LATERAL
20	SANJEEVI M	ICE	UG	69.71	LATERAL
21	RINO JACOB	ICE	UG	81.64	LATERAL
22	SENTHIL KUMAR R	MECH	UG	80.3	LATERAL
23	NITHISH KUMAR J	MECH	UG	80.09	LATERAL
24	NADHAKUMAR R E	MECH	UG	81.59	LATERAL
25	PRASANNAVENKAT R	MECH	UG	76.95	LATERAL
26	GANESH R	MECH	UG	78.98	LATERAL
27	ARAVINDHAN P	MECH	UG	78.25	LATERAL
28	MANOHAR M	MECH	UG	76.27	LATERAL

29	ULAGALANTHA PERUMAL S	MECH	UG	66.93	LATERAL
30	KARTHIKEYAN T	MECH	UG	76.61	LATERAL
31	PRAVEEN KUMAR D	MECH	UG	71.7	LATERAL
32	SIVANANTH M	MECH	UG	71.43	LATERAL

List of candidates who have been offered admission

S.NO	NAME OF THE STUDENT	DEPARTMENT
UG - FIRST YEAR		
1	SANJAY. B	MECH
2	ATHIRA . D	CSE
3	BOOPATHI.V	CSE
4	CHANDRU. M	CSE
5	PRAVEENRAJ .V .J	CSE
6	SRIVARSHINI .M	ECE
7	THAMBIDURAI .T	ECE
8	MUTHUKUMARAN S	AUTO
9	SRI GAYATHRI S	CIVIL
10	SURESH GOPI K	CIVIL
11	ABISHEK M	CSE
12	BALAMOORTHY S	CSE
13	DHULASILINGAM S	CSE
14	DIVYA M	CSE
15	GUNASEELAN S	CSE
16	HARISH R	CSE
17	JEEVAKUMAR	CSE
18	KAVIPRIYA S	CSE
19	MINIBALA G	CSE
20	MUTHUSELVAM P	CSE
21	PAVITHRA V	CSE
22	RAGANITHI S	CSE
23	RAJAMANI	CSE
24	RAKUL A	CSE
25	RAVIBHARATHI G	CSE
26	RAVIKUMAR S	CSE
27	SANTHOSH V	CSE
28	SURYAMOORTHY S	CSE
29	THANVEER S	CSE
30	VALLINAYAGAM N	CSE
31	VEERAMANI P	CSE
32	EVANJALIN SILPU P	ECE
33	KALAIYARASAN K	ECE
34	MANIYARASU	ECE
35	MUTHUMARIYAPPAN V	ECE
36	SANTHOSH M	ECE
37	GOWTHAM M	EEE
38	THAVASAKTHI M	EEE

39	GNANA PRATHISA D	ICE
40	MAHALAKSHMI J	ICE
41	THAUFIK J	ICE
42	UMAR M	ICE
43	VIGNESHWARAN R	ICE
44	REAGIS S	MECH
PG - MBA		
1	SHELLY SEBASTIAN	MBA
2	SANJEEVI.R	MBA
3	SHAMSAD.K.A	MBA
4	HEMANTH KUMAR.S	MBA
5	SANJEEVI.R	MBA
6	MUHAMMED ARSHIN.K	MBA
7	ABHISHEK SANTHOSH	MBA
8	SRI SHIVANI S	MBA
PG - M.E (STRUCTURAL ENGINEERING)		
1	BASIN S	M.E (SE)
2	KARUPPUSAMY. V	M.E (SE)
3	RAVIKUMAR. M	M.E (SE)
4	SANKAR KUMAR. S	M.E (SE)
5	SHAHANA FAROOQ.K	M.E (SE)
6	SHAJEEH FASIL.T	M.E (SE)
7	SIKKANDAR.M	M.E (SE)
8	SIYAS	M.E (SE)
9	TARIKH ANVAR.E	M.E (SE)
10	THAMANNA.K.P	M.E (SE)
11	THILAGAN.K.M	M.E (SE)
12	VISHNU SANKAR.C.B	M.E (SE)

PG -M.E (COMPUTER SCIENCE ENGINEERING)		
1	MOHAMMED RAFEEQUE .K	M.E (CSE)
2	MIDHUN RAJ K	M.E (CSE)
3	JASON P	M.E (CSE)
LATERAL		
1	LOGESHWARAN E	AUTO
2	SABARI S	AUTO
3	SUBRAMANIAN N	CIVIL
4	MOHAMED MOHAIDEEN BADUSHA M	CIVIL
5	AJMEER S	CIVIL
6	SHAKTHI KUMARAN S	CSE
7	VASANTH R	CSE
8	VIGNESH G	CSE
9	CHANDRU R	CSE
10	SANTHOSHKUMAR M	CSE
11	SURYA M	EEE
12	MONISH P	EEE
13	VIJAYAKUMAR M	EEE
14	RAM KUMAR V	EEE
15	THAVEEN M	EEE
16	NAVEENKUMAR S	ICE
17	SENTHAMILARASAN G	ICE
18	ASWATH G	ICE
19	CHATTANATHAN R	ICE
20	SANJEEVI M	ICE
21	RINO JACOB	ICE
22	SENTHIL KUMAR R	MECH
23	NITHISH KUMAR J	MECH
24	NADHAKUMAR R E	MECH
25	PRASANNAVENKAT R	MECH
26	GANESH R	MECH
27	ARAVINDHAN P	MECH
28	MANOHAR M	MECH
29	ULAGALANTHA PERUMAL S	MECH
30	KARTHIKEYAN T	MECH
31	PRAVEEN KUMAR D	MECH
32	SIVANANTH M	MECH

Waiting list of the candidate in order of merit to be operative from the last date of joining of the first list candidate – NIL

List of candidates who joined within the date, vacancy position in each category before operation of waiting list

S.NO	NAME OF THE STUDENT	DEPARTMENT
1	SANJAY. B	MECH
2	ATHIRA . D	CSE
3	BOOPATHI.V	CSE
4	CHANDRU. M	CSE
5	PRAVEENRAJ .V .J	CSE
6	SRIVARSHINI .M	ECE
7	THAMBIDURAI .T	ECE
8	MUTHUKUMARAN S	AUTO
9	SRI GAYATHRI S	CIVIL
10	SURESH GOPI K	CIVIL
11	ABISHEK M	CSE
12	BALAMOORTHY S	CSE
13	DHULASILINGAM S	CSE
14	DIVYA M	CSE
15	GUNASEELAN S	CSE
16	HARISH R	CSE
17	JEEVAKUMAR	CSE
18	KAVIPRIYA S	CSE
19	MINIBALA G	CSE
20	MUTHUSELVAM P	CSE
21	PAVITHRA V	CSE
22	RAGANITHI S	CSE
23	RAJAMANI	CSE
24	RAKUL A	CSE
25	RAVIBHARATHI G	CSE
26	RAVIKUMAR S	CSE
27	SANTHOSH V	CSE
28	SURYAMOORTHY S	CSE
29	THANVEER S	CSE
30	VALLINAYAGAM N	CSE
1	VEERAMANI P	CSE
32	EVANJALIN SILPU P	ECE
33	KALAIYARASAN K	ECE
34	MANIYARASU	ECE

35	MUTHUMARIYAPPAN V	ECE
36	SANTHOSH M	ECE
37	GOWTHAM M	EEE
38	THAVASAKTHI M	EEE

Vacancy position in each category before operation of waiting list

S.No	BRANCH	OC	BC	BCM	MBC	SC	SCA	ST	TOTAL
1	**B.E(AUTO)**	9	8	1	6	4	1	0	29
2	**B.E(CIVIL)**	9	8	1	6	4	1	0	29
3	**B.E(CSE)**	17	16	2	12	9	1	1	58
4	**B.E(ECE)**	19	15	2	11	9	2	1	59
5	**B.E(ECE)**	9	7	1	6	5	1	0	29
6	**B.E(ICE)**	9	8	1	6	4	1	0	29
7	**B.E(MECH)**	18	15	2	11	9	2	1	58

15.NUMBER OF CLASS ROOMS AND SIZE OF EACH

SL.NO.	NUMBERS	SIZE(LXB) IN M	AREA IN SQ.M
1	19	7.82 X 9.18	71.78
2	2	9.46 X 9.13	86.36
3	6	6.00 X 9.13	54.78
4	1	12.40 X 9.10	112.84
5	1	12.70 X 9.10	115.57
6	1	12.10 X 9.10	110.11
7	1	13.00 X 9.10	118.30
8	8	8.30 X 9.10	75.53
9	7	8.20 X 9.10	74.62

NUMBER OF TUTORIAL ROOMS AND SIZE OF EACH

SL.NO.	NUMBERS	SIZE(LXB) IN M	AREA IN SQ.M
1	6	8.20X9.40	82.56
2	3	9.94 X 9.53	94.73
3	1	10.80 X 9.10	98.28

NUMBER OF LABORATORIES AND AND SIZE OF EACH

SL. No	**Degree & Course**	**Laboratory/Workshop/Studio**	**Name of the Laboratory**	**Area of the Laboratory required(sq.m.)**	**Area of the Laboratory available(sq.m.)**
1	B.E.-Civil Engineering	Engg. & Tech. Laboratory	CE8311 CONSTRUCTION MATERIALS LABORATORY	66	123

2	B.E.-Civil Engineering	Engg. & Tech. Laboratory	CE8611 HIGHWAY ENGINEERING LABORATORY	66	123
3	B.E.-Civil Engineering	Engg. & Tech. Laboratory	CE8512 WATER AND WASTE WATER ANALYSIS LABORATORY	66	127
4	B.E.-Civil Engineering	Engg. & Tech. Laboratory	CE8511 SOIL MECHANICS LABORATORY	66	201
5	B.E.-Civil Engineering	Engg. & Tech. Laboratory	CE8361 SURVEYING LABORATORY	66	104
6	B.E.-Civil Engineering	Engg. & Tech. Laboratory	CE8461 HYDRAULIC ENGINEERING LABORATORY	66	341.5
7	B.E.-Civil Engineering	Engg. & Tech. Laboratory	CE8481 STRENGTH OF MATERIALS LABORATORY	66	164
8	B.E.-Civil Engineering	Engg. & Tech. Laboratory	CE8211 COMPUTER AIDED BUILDING DRAWING	66	83.64

9	B.E.-Automobile Engineering	Engg. & Tech. Laboratory	AT8612 TWO AND THREE WHEELERS LABORATORY	66	168
10	B.E.-Automobile Engineering	Engg. & Tech. Laboratory	AT8712 VEHICLE MAINTENANCE LABORATORY	66	231
11	B.E.-Automobile Engineering	Engg. & Tech. Laboratory	AT8711 ENGINE PERFORMANCE AND EMISSION TESTING LABORATORY	66	168
12	B.E.-Automobile Engineering	Engg. & Tech. Laboratory	EC8382 ELECTRONICS AND MICROPROCESSORS LABORATORY	66	66
13	B.E.-Automobile Engineering	Engg. & Tech. Laboratory	ME8381 COMPUTER AIDED MACHINE DRAWING	66	76
14	B.E.-Automobile Engineering	Engg. & Tech. Laboratory	CE8381 STRENGTH OF MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY	66	506

15	B.E.-Automobile Engineering	Engg. & Tech. Laboratory	AT8411 AUTOMOTIVE COMPONENTS LABORATORY	66	231
16	B.E.-Automobile Engineering	Engg. & Tech. Laboratory	AT8511 AUTOMOTIVE ELECTRICAL AND ELECTRONICS LABORATORY	66	66
17	B.E.-Automobile Engineering	Engg. & Tech. Laboratory	AT8512 AUTOMOTIVE FUELS AND LUBRICANTS LABORATORY	66	168
18	B.E.-Automobile Engineering	Engg. & Tech. Laboratory	AT8611 COMPUTER AIDED ENGINE AND CHASSIS DESIGN LABORATORY	66	76
19	B.E.-Mechanical Engineering	Engg. & Tech. Laboratory	ME8711 SIMULATION AND ANALYSIS LABORATORY	66	83.6
20	B.E.-Mechanical Engineering	Engg. & Tech. Laboratory	ME8381 Computer Aided Machine Drawing	66	83.6
21	B.E.-Mechanical	Engg. & Tech. Laboratory	ME8462 MANUFACTURING	66	378.3

	Engineering		TECHNOLOGY LABORATORY II		
22	B.E.-Mechanical Engineering	Engg. & Tech. Laboratory	ME8511 KINEMATICS AND DYNAMICS LABORATORY	66	100
23	B.E.-Mechanical Engineering	Engg. & Tech. Laboratory	ME8512 THERMAL ENGINEERING LABORATORY	66	350
24	B.E.-Mechanical Engineering	Engg. & Tech. Laboratory	ME8513 METROLOGY and MEASUREMENTS LABORATORY	66	100
25	B.E.-Mechanical Engineering	Engg. & Tech. Laboratory	ME8681 CAD/CAM LABORATORY	66	83.6
26	B.E.-Mechanical Engineering	Engg. & Tech. Laboratory	ME8781 MECHATRONICS LABORATORY	66	111.4
27	B.E.-Mechanical Engineering	Engg. & Tech. Laboratory	ME8361 MANUFACTURING TECHNOLOGY LABORATORY I	66	378.3
28	B.E.-Mechanical Engineering	Engg. & Tech. Laboratory	EE8361 ELECTRICAL ENGINEERING	66	352

			LABORATORY		
29	B.E.-Mechanical Engineering	Engg. & Tech. Laboratory	CE8381 STRENGTH OF MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY	66	506
30	B.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	EC8681 MICROPROCESSOR AND MICROCONTROLLER LABORATORY	66	200
31	B.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	IT8761 SECURITY LABORATORY	66	66
32	B.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	CS8383 OBJECT ORIENTED PROGRAMMING LABORATORY	66	66
33	B.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	CS8261 C PROGRAMMING LABORATORY	66	66
34	B.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	CS8381 DATA STRUCTURES LABORA	66	66

			TORY		
35	B.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	CS8382 DIGITAL SYSTEM LABORATORY	66	75.4
36	B.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	CS8711 CLOUD COMPUTING LABORATORY	66	66
37	B.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	CS8662 MOBILE APPLICATION DEVELOPMENT LABORATORY	66	66
38	B.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	CS8661 INTERNET PROGRAMMING LABORATORY	66	66
39	B.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	CS8582 OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY	66	66
40	B.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	CS8581 NETWORKS LABORATORY	66	66
41	B.E.-Computer Science and	Engg. & Tech. Laboratory	CS8481 DATABASE MANAGEME	66	66

	Engineering		NT SYSTEMS LABORATORY		
42	B.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	CS8461 OPERATING SYSTEMS LABORATORY	66	66
43	B.E.-Electronics and Communication Engineering	Engg. & Tech. Laboratory	EC8561 COMMUNICATION SYSTEMS LABORATORY	66	75.4
44	B.E.-Electronics and Communication Engineering	Engg. & Tech. Laboratory	EC8361 ANALOG AND DIGITAL CIRCUITS LABORATORY	66	75.4
45	B.E.-Electronics and Communication Engineering	Engg. & Tech. Laboratory	EC8381 FUNDAMENTALS OF DATA STRUCTURES IN C LABORATORY	66	120
46	B.E.-Electronics and Communication Engineering	Engg. & Tech. Laboratory	EC8461 CIRCUITS DESIGN AND SIMULATION LABORATORY	66	75.4
47	B.E.-Electronics and Communication Engineering	Engg. & Tech. Laboratory	EC8761 ADVANCED COMMUNICATION LABORATORY	66	75.9
48	B.E.-Electronics and Communicatio	Engg. & Tech. Laboratory	EC8711 EMBEDDED LABORATOR	66	120

	n Engineering		Y		
49	B.E.- Electronics and Communication Engineering	Engg. & Tech. Laboratory	EC8681 MICROPROCESSOR AND MICROCONTROLLER LABORATORY	66	200
50	B.E.-Electronics and Communication Engineering	Engg. & Tech. Laboratory	EC8661 VLSI DESIGN LABORATORY	66	120
51	B.E.-Electronics and Communication Engineering	Engg. & Tech. Laboratory	EC8563 COMMUNICATION NETWORKS LABORATORY	66	120
52	B.E.-Electronics and Communication Engineering	Engg. & Tech. Laboratory	EC8562 DIGITAL SIGNAL PROCESSING LABORATORY	66	120
53	B.E.-Electronics and Communication Engineering	Engg. & Tech. Laboratory	EC8261 CIRCUITS AND DEVICES LABORATORY	66	75.4
54	B.E.-Electronics and Communication Engineering	Engg. & Tech. Laboratory	EC8462 LINEAR INTEGRATED CIRCUITS LABORATORY	66	75.4

55	B.E.-Electrical and Electronics	Engg. & Tech. Laboratory	EE8311 ELECTRICAL MACHINES	66	291

	Engineering		LABORATORY I		
56	B.E.-Electrical and Electronics Engineering	Engg. & Tech. Laboratory	EC8311 ELECTRONICS LABORATORY	66	67
57	B.E.-Electrical and Electronics Engineering	Engg. & Tech. Laboratory	EE8261 ELECTRIC CIRCUITS LABORATORY	66	67
58	B.E.-Electrical and Electronics Engineering	Engg. & Tech. Laboratory	EE8511 CONTROL AND INSTRUMENTATION LABORATORY	66	67
59	B.E.-Electrical and Electronics Engineering	Engg. & Tech. Laboratory	EE8661 POWER ELECTRONICS AND DRIVES LABORATORY	66	104
60	B.E.-Electrical and Electronics Engineering	Engg. & Tech. Laboratory	EE8681 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	66	200
61	B.E.-Electrical and Electronics Engineering	Engg. & Tech. Laboratory	CS8383 OBJECT ORIENTED PROGRAMMING LABORATORY	66	73
62	B.E.-Electrical and Electronics	Engg. & Tech. Laboratory	EE8411 ELECTRICAL MACHINES	66	291

	Engineering		LABORATORY II		
63	B.E.-Electrical and Electronics Engineering	Engg. & Tech. Laboratory	EE8711 POWER SYSTEM SIMULATION LABORATORY	66	73
64	B.E.-Electrical and Electronics Engineering	Engg. & Tech. Laboratory	EE8712 RENEWABLE ENERGY SYSTEMS LABORATORY	66	67
65	B.E.-Electrical and Electronics Engineering	Engg. & Tech. Laboratory	EE8461 LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY	66	75
66	B.E.-Instrumentation and Control Engineering	Engg. & Tech. Laboratory	EI8361 MEASUREMENTS AND TRANSDUCERS LABORATORY	66	105
67	B.E.-Instrumentation and Control Engineering	Engg. & Tech. Laboratory	CS8383 OBJECT ORIENTED PROGRAMMING LABORATORY	66	66
68	B.E.-Instrumentation and Control Engineering	Engg. & Tech. Laboratory	EE8681 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	66	200

69	B.E.-Instrumentation and Control Engineering	Engg. & Tech. Laboratory	EE8261 ELECTRIC CIRCUITS LABORATORY	66	67
70	B.E.-Instrumentation and Control Engineering	Engg. & Tech. Laboratory	CS8381 DATA STRUCTURES LABORATORY	66	66
71	B.E.-Instrumentation and Control Engineering	Engg. & Tech. Laboratory	EI8661 PROCESS CONTROL LABORATORY	66	127
72	B.E.-Instrumentation and Control Engineering	Engg. & Tech. Laboratory	EI8761 INDUSTRIAL AUTOMATION LABORATORY	66	127
73	B.E.-Instrumentation and Control Engineering	Engg. & Tech. Laboratory	EI8762 INSTRUMENTATION SYSTEM DESIGN LABORATORY	66	127
74	B.E.-Instrumentation and Control Engineering	Engg. & Tech. Laboratory	EI8561 INDUSTRIAL INSTRUMENTATION LABORATORY	66	105
75	B.E.-Instrumentation and Control Engineering	Engg. & Tech. Laboratory	EI8461 DEVICES AND MACHINES LABORATORY	66	419

76	B.E.-Instrumentation and Control Engineering	Engg. & Tech. Laboratory	EE8461 LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY	66	75.4
77	B.E.- General Engineering	Engg. & Tech. Laboratory	GE8261 ENGINEERING PRACTICES LABORATORY	66	531.8
78	B.E.- General Engineering	Engg. & Tech. Laboratory	BE8261 BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATOR	66	358
79	B.E.- General Engineering	Engg. & Tech. Laboratory	BS8161 PHYSICS & CHEMISTRY LABORATORY	66	375
80	B.E.- General Engineering	Engg. & Tech. Laboratory	GE8161 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	66	72
95	M.B.A.-Master of Business Administration	M.B.A.Laboratory	BA5211 Data Analysis and Business Modeling	66	164
96	M.B.A.-Master	Engg. & Tech.	BA5111	66	72

	of Business Administration	Laboratory	Spoken and Written Communication		

97	M.E.-Structural Engineering	Engg. & Tech. Laboratory	ST5211 Advanced Structural Engineering Laboratory	66	107
98	M.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	CP5261 DATA ANALYT ICS LABORA TORY	66	66
99	M.E.-Computer Science and Engineering	Engg. & Tech. Laboratory	CP5161 Data Structures Laboratory	66	66

NUMBER OF DRAWING HALLS WITH CAPACITY OF EACH

SL.NO.	NUMBERS	SIZE(LXB) IN M	AREA IN SQ.M	CAPACITY
1	2	13.1X14.1	369.42	60
2	2	15.64 X 9.18	143.57	60

NUMBER OF COMPUTER CENTRES WITH CAPACITY OF EACH

SL.NO.	NUMBERS	CAPACITY
1	3	75
2	4	40

CENTRAL EXAMINATION FACILITY, NUMBER OF ROOMS AND CAPACITY OF EACH

SL.NO.	NUMBERS	CAPACITY
1	56	25

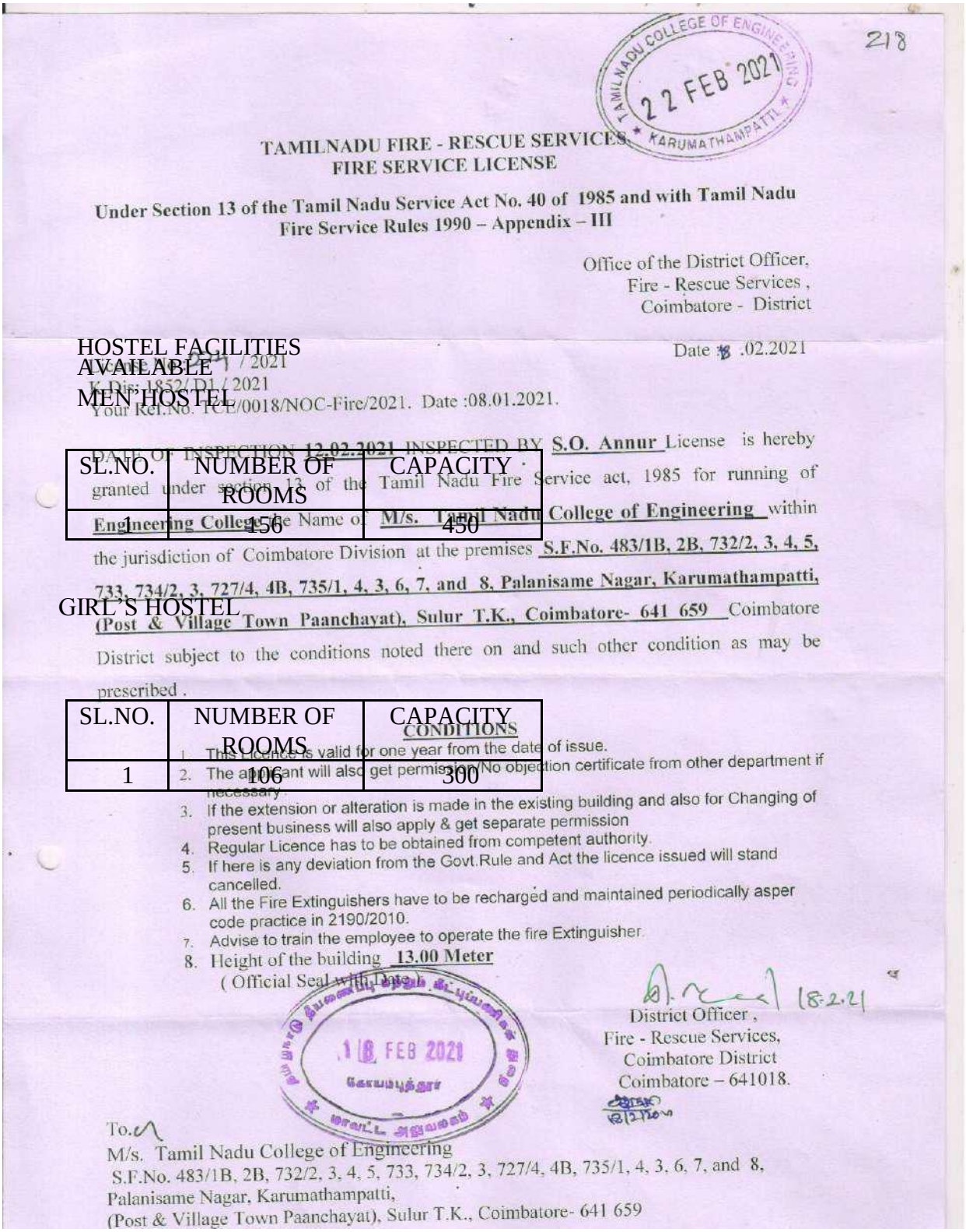
ONLINE EXAMINATION FACILITY (NUMBER OF NODES , INTERNET BANDWIDTH,ETC)

SL.NO.	NUMBER OF NODES	CAPACITY
1	60	60
2	50	50
3	110	110

BARRIER FREE BUILT ENVIRONMENT FOR DISABLED AND ELDERLY PERSONS

RAMP WITH HAND RAILS AND LIFT FACILITIES ARE PROVIDE

FIRE AND SAFETY CERTIFICATE



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TAMILNADU COLLEGE OF ENGINEERING * KARUMATHAMPATTI * 22 FEB 2021

TAMILNADU FIRE - RESCUE SERVICES
FIRE SERVICE LICENSE

Under Section 13 of the Tamil Nadu Service Act No. 40 of 1985 and with Tamil Nadu Fire Service Rules 1990 – Appendix – III

Office of the District Officer,
Fire - Rescue Services ,
Coimbatore - District

Date 18 .02.2021

K.Dis. 1852/D1 / 2021
Your Ref.No. TCE/0018/NOC-Fire/2021. Date :08.01.2021.

DATE OF INSPECTION **12.02.2021** INSPECTED BY **S.O. Annur** License is hereby granted under section 13 of the Tamil Nadu Fire Service act, 1985 for running of **Engineering College** in the Name of **M/s. Tamil Nadu College of Engineering** within the jurisdiction of Coimbatore Division at the premises **S.F.No. 483/1B, 2B, 732/2, 3, 4, 5, 733, 734/2, 3, 727/4, 4B, 735/1, 4, 3, 6, 7, and 8, Palanisame Nagar, Karumathampatti, (Post & Village Town Paanchayat), Sulur T.K., Coimbatore- 641 659** Coimbatore District subject to the conditions noted there on and such other condition as may be prescribed .

HOSTEL FACILITIES AVAILABLE

MEN HOSTEL

SL.NO.	NUMBER OF ROOMS	CAPACITY
1	156	450

GIRL'S HOSTEL

SL.NO.	NUMBER OF ROOMS	CAPACITY
1	106	300

CONDITIONS

1. This Licence is valid for one year from the date of issue.
2. The applicant will also get permission/No objection certificate from other department if necessary.
3. If the extension or alteration is made in the existing building and also for Changing of present business will also apply & get separate permission
4. Regular Licence has to be obtained from competent authority.
5. If here is any deviation from the Govt.Rule and Act the licence issued will stand cancelled.
6. All the Fire Extinguishers have to be recharged and maintained periodically asper code practice in 2190/2010.
7. Advise to train the employee to operate the fire Extinguisher.
8. Height of the building **13.00 Meter**

(Official Seal with Date)

18 FEB 2021 Coimbatore

18.2.21

District Officer ,
Fire - Rescue Services,
Coimbatore District
Coimbatore – 641018.

To.
M/s. Tamil Nadu College of Engineering
S.F.No. 483/1B, 2B, 732/2, 3, 4, 5, 733, 734/2, 3, 727/4, 4B, 735/1, 4, 3, 6, 7, and 8,
Palanisame Nagar, Karumathampatti,
(Post & Village Town Paanchayat), Sulur T.K., Coimbatore- 641 659

HOSTEL FACILITIES

AVAILABLE
MEN'HOSTEL

SL.NO.	NUMBER OF ROOMS	CAPACITY
1	156	450

GIRL'S HOSTEL

SL.NO.	NUMBER OF ROOMS	CAPACITY
1	106	300

LIBRARY

NUMBER OF LIBRARY BOOKS/TITLES/JOURNALS AVAILABLE

NUMBER OF VOLUMES	70730
NUMBER OF TITLE	28470
NUMBER OF JOURNALS	128

LIST OF ONLINE NATIONAL AND INTERNATIONAL JOURNALS SUBSCRIBED-

E-LIBRARY FACILITIES AVAILABLE

http://www.delnet.in

NATIONAL DIGITAL LIBRARY SUBCRIPTION DETAIL

Librarian@tnce.in

LABORATORY AND WORKSHOP

LIST OF MAJOR EQUIPMENT/FACILITIES IN EACH LABORATORY/WORKSHOP

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: AUTOMOTIVE EMBEDDED AND CONTROL SYSTEM LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial / Invoice No
1	Deisgn and simulation Prototype power window & Sunroof control using DC Motor 1) Working model of sun roof setup	1	68,500	19-09-11	EQ/173/11-12 19
2	MPS 85-3-8085 based microprocessor trainer LED display with power supply +5V @ 3A +/- 12V 250mA, +30V @ 100mA	10	73,500	12-10-12	

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: AUTOMOTIVE FUELS & LUBRICANTS LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial / Invoice No
1	Bomb Calorimeter	1	58760	20/08/2007	093
2	Single Distillation apparatus	1	63441	20/08/2007	093
3	Exhaust gas analyzer (Petrol Engine)	1	220877	23/04/2010	0020/10-11
4	Diesel smoke meter	1	150800	15/09/2010	179
5	Fuel Analysis Test apparatus	1	86500	06-06-13	EQ/052/13-14
6	Boys Gas Calorimeter	1	65000	06-06-13	EQ/052/13-14
7	Ramsbottom Carbon Residue Apparatus	1	71500	06-06-13	EQ/052/13-14
8	Copper Strip Corrosion apparatus	1	62500	06-06-13	EQ/052/13-14
9	Work table(SS304)	8	115500	19/8/2014	009

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: COMPUTER AIDED DESIGN LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial/Invoice No
1	Computer System	34	1010650	15.06.2010	(Span Office)
2	CATIA V5 R21	10 users	199512	17.08.2012	P1/1213/010
3	ANSYS Academic Teaching	50 users	525000	06.09.2012	030-2012-13
4	HP 3330 Series PC	12	346500	10.12.2012	J9P6054897

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: INTERNAL COMBUSTION ENGINES LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial/Invoice No
1	LENOVA Desktop PC	2	80500	11-09-13	4069/13-14
2	Exhaust gas Analyzer AVL make	1	337838	27/11/2013	20/2013-14
3	Multicylinder petrol engine PSP 2304	1	714065	30/12/2013	26/2013-14
4	Multicylinder diesel engine test rig	1	1370545	25/02/2014	31/2013-14

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: VEHICLE MAINTENANCE LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial / Invoice No
1	"FERRET" UEA Engine Analyzer	1	55000	28.07.2009	5865
2	Air compressor	1	66709.76	13.10.2009	0170/09-12
3	Tyre Changer	1	90000	13.10.2009	01699/09-10
4	Wheel Aligner	1	469998	24/02/2009	613/68002987
5	Wheel Balancer	1	110000	13/10/2009	0169/09-10
6	Cylinder Reboring machine	1	115000	12-10-09	12683

Tamilnadu College of Engineering

Department of Automobile Engineering

Equipment Details

Name of the Lab: 2 & 3 WHEELERS LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial/Invoice No
	Computerized Shock absorber test rig	1	249600	10-11-07	0283
	Computerized two wheeler chassis dynamometer	1	364000	10-11-07	0283
	Eddy current dynamometer	1	142272	10-11-07	0283
	Two wheeler chain tension test rig	1	135000	06-04-13	EQ/051/13-14
	Study of 3 wheeler chassis frame and power transmission system	1	76000	27/06/2013	EQ/072/13-14

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: AUTOMOTIVE COMPONENTS LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial / Invoice No
1	Master cylinder re-boring machine	1	115000	10-12-09	12683
2	MPFI engine working condition	1	55000	08-08-12	1255

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: AUTOMOTIVE ELECTRICALS AND ELECTRONICS LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial / Invoice No
1	Auto Electrical Test Bench	1	72000	02.08.2008	624
2	Ignition system Fault Diagnosis	1	56000	08.09.208	624

Computer Lab - System Details

1st Year – Computer Lab

Model	PROCESSOR	HARD DISK	RAM	MOTHER BOARD TYPE	MONITOR	Numbers
Acer	Intel Pentium [R] DCPU@ 3.00 GHz	160 GB	1 GB DDR-2	i945G	Acer LCD	30

1st Year – Language Lab

Model	PROCESSOR	HARD DISK	RAM	MOTHER BOARD TYPE	MONITOR	Numbers
HCL	Pentium D 820	160 GB	1 GB DDR-1 & 4x256* MB	P5P800-VM/S	HCL	30

Technopark

Model	PROCESSOR	HARD DISK	RAM	MOTHER BOARD TYPE	MONITOR	Numbers
HP	INTEL®CORE™ i3-2120-CPU@3.30GHz	500 GB	8GB & 4 GB	Foxconn 17A0	HP	50
Acer Veriton Series-Black	Intel Core 2 Quad CPU @ 2.50 GHz	320 GB	2GB	P35/G33/G31	ACER	30
Lenovo	Intel Core 2 duo CPU @ 2.66 GHz	160 GB	2 GB	P35/G33/G31	Lenovo	20

Mechanical Lab

Model	PROCESSOR	HARD DISK	RAM	MOTHER BOARD TYPE	MONITOR	Numbers
Acer - Power Series	Intel Pentium [R] D CPU @ 3.00 GHz	160 GB	2 GB DDR2	MSI MS - 7267	ACER	40

Civil Lab

Model	PROCESSOR	HARD DISK	RAM	MOTHER BOARD TYPE	MONITOR	Numbers
Acer - Power Series	Intel Pentium [R]Core 2 Duo E4700 @ 2.60 GHz	160 GB	2 GB DDR2	MS - 7529 P35/G33/G31	ACER	20

EEE LAB

Model	PROCESSOR	HARD DISK	RAM	MOTHER BOARD TYPE	MONITOR	Numbers
Lenova	Intel core 2 Duo cpu E-7300 @ 2.66GHz	160 GB	2 GB DDR2	Lenova G33/G31	Lenova	30

AUTOMOBILE LAB

Model	PROCESSOR	HARD DISK	RAM	MOTHER BOARD TYPE	MONITOR	Numbers
Acer veriton series	Pendium Dual-core cpu E5400@2.70GHz	320 GB	2 GB DDR2	Acer G31T - M	Acer	40

ICE LAB

Model	PROCESSOR	HARD DISK	RAM	MOTHER BOARD TYPE	MONITOR	Numbers
HP Pro 3330MT	Intel® core i3-2120 @ 3.30GHZ	500 GB	2 GB DDR3	FoxConn 17AO	HP	20

MBA LAB

Model	PROCESSOR	HARD DISK	RAM	MOTHER BOARD TYPE	MONITOR	Numbers
Acer Veriton Series-Black	Intel Pentium [R] Dual Core CPU	320 GB	2 GB DDR2	P35/G33/G31	ACER	20

NetworkS & VLSI Lab

Model	PROCESSOR	HARD DISK	RAM	MOTHER BOARD TYPE	MONITOR	Numbers
LENOVA	Intel core[R] 2 Duo	160 GB	1 GB DDR2	P35/G33/G31	LENOVA	20

Total number of Systems - 350

INTERNET

	REQUIRED (MBPS)	AVAILABLE (MBPS)
Bandwidth	**300**	**300**

Terminals on LAN/WAN

	Number of terminals	Number of terminals on LAN/WAN	Number of Printers
Available	**350**	**330**	**18**

SOFTWARES

SOFTWARE REQUIRED	NAME OF THE SOFTWARE AVAILABLE
System Software	➢ MS Windows Server 2016 ➢ MS Windows Server 2012 ➢ MS Windows Server 2008 ➢ MS Windows 10 ➢ MS Windows 8 ➢ MS Windows 7 ➢ CentOS 6.5 ➢ Ubuntu 16.04 ➢ Ubuntu 16.04 Server
Application Software	➢ **Microsoft Campus Agreement (Edu Cloud)** ➢ I-DEAS NX Modeler A300 ➢ CNC Train Simulation ➢ I-DEAS FEA Bundle ➢ Uni Graphics NX CAM ➢ Xilinx ➢ Orcad Capture with PSpice A/D – 5 users ➢ 3D Studio Max ➢ Ansys v14 ➢ MAT Lab 5.2 ➢ Turbo C ➢ Tally ERB 9 ➢ SPSS ➢ CATIA ➢ C COMPILER ➢ HI CLASS ➢ Adobe Photoshop 7.0 ➢ Adobe Premiere 6.5 ➢ Language Lab Software ➢ Visual Studio Professional ➢ MS OFFICE 365 PRO PLUS

Application Software	➢ seqrite Endpoint security ➢ MODEL SIM ➢ Android Studio ➢ Java ➢ Open Stack ➢ Oracle virtual Box ➢ GUNPG ➢ SNORT ➢ SELENIUM ➢ APACHE JMETER ➢ JUNIT ➢ OBA

INNOVATION CELL

ABOUT IIC

Ministry of Human Resource Development (MHRD), Govt. of India has established 'MHRD's Innovation Cell (MIC)' to systematically foster the culture of Innovation amongst all Higher Education Institutions (HEIs). The primary mandate of MIC is to encourage, inspire and nurture young students by supporting them to work with new ideas and transform them into prototypes while they are informative years.

MIC has envisioned encouraging creation of 'Institution's Innovation Council (IICs)' across selected HEIs. A network of these IICs will be established to promote innovation in the Institution through multitudinous modes leading to an innovation promotion eco-system in the campuses.

Functions of IIC's

Promote innovation in the Institution through multitudinous modes leading to an innovation promotion eco-system in the campus.

To conduct various innovation and entrepreneurship-related activities prescribed by Central MIC in time bounded fashion.

Identify and reward innovations and share success stories.

Organize periodic workshops / seminars / interactions with entrepreneurs, investors, professionals and create a mentor pool for student innovators.

Network with peers and national entrepreneurship development organizations.

Create an Institution's Innovation portal to highlight innovative projects carried out by institution's faculty and students.

Organize Hackathons, idea competition, mini-challenges, etc. with the involvement of industries.

Benefits of joining IIC's Network

No major capital investment required for establishing IIC as it will make use of existing local ecosystem.

Students/Faculty associated with IIC will get exclusive opportunity to participate in various Innovation related initiatives and competitions organized by MHRD.

Win exciting Prizes/Certificates every month.

Meet/Interact with renowned Business Leaders and top-notch academicians.

Opportunity to nurture and prototype new ideas.

Mentoring by Industry Professionals.

Experimentation with new/latest technologies.

IIC Members Details		
Name of Head	**Email of Head**	**Mobile Number of Head**
Dr.M.KARTHIKEYAN	principal@tnce.in	9894612700
President of IIC		
Name of President	**Email of President**	**Mobile Number of President**
Dr.R.Sivakumar	rsksivame@gmail.com	9345799075

IIC-Faculty Memebrs Details

Position	Name	Email	Mobile
Convener	Dr.G.Saravanakumar	saravanakumar579@yahoo.com	8903827798
Vice President	DR. SHANTHI A S	babushanthi@gmail.com	9942288733
Social Media Coordinator	MRS.R SIVARANJANI	sivaranjanir-cse@tnce.in	9688203006
Innovation Activity Coordinator	MR. KANNAN T	kannabbran@gmail.com	9952737201
Internship Activity Coordinator	DR. DHARMALINGAM P	dharmalinga72@gmail.com	9942082725
Start up Activity Coordinator	MR. PALANIAPPAN V R	vpntce@gmail.com	9994103214
IPR Activity Coordinator	MRS. DIVYA MOHANA PRIYA G	divyapriyatce@gmail.com	9786773776
ARIIA Coordinator	KARTHIKEYAN R	karthikkrk2006@gmail.com	9865899599

NIRF Coordinator	MR. T.SUDHAKAR	placement@tnce.in	9655006562
Member	MR. RAM KARTHIK KUMAR	k.rkkumar@yahoo.com	9789627321
Member	Mr.L.PERIYASAMY	periyasamy.civil@tnce.in	9894456077
Member	MRS.R.GOKILA	hi.goks@gmail.com	9842574396
Member	MRS.C.RUBY SHARMILA	sharmi.ruby2011@gmail.com	9486113074

Students Member Details

Sr.No	Name	Email	Mobile	Discipline
1	KALAIARASAN T	kalairasan1419@gmail.com	6369413041	CSE
2	ANANDHAKUMAR P	anandhakumarp2001@gmail.com	6383528741	CSE
3	ANANTHI D	ananthiduraisamy2001@ gmail.com	7558138749	CSE
4	SATHISHKUMAR T	sathishkumar1241208@ gmail.com	6379078317	CSE
5	S.SRIDEVI	Sridevi-ece@gmail.com	9698208798	ECE
6	S.MOUNIKA	Mounika_s@gmail.com	7092684100	ECE

NUMBER OF LIBRARY BOOKS/TITLES/JOURNALS AVAILABLE

NUMBER OF VOLUMES	70730
NUMBER OF TITLE	28470
NUMBER OF JOURNALS	128

GAMES AND SPORTS FACILITIES

Sports and games have played a vital role in Tamilnadu College of Engineering. Sports activities help the students to keep them physically, mentally, emotionally and intellectually fit. Participation in games and sports invariably ensures good health, fitness and, generally, freedom from ailments of various types. Physical fitness is essential for proficiency in studies and for winning distinctions in examinations. Ailing bodies do not make for sharp brains. Exercise in some form or another is necessary, and sports provide an easy method to ensure such fitness. Our college provides a good platform for the students to get acquainted with both indoor and outdoor games

The College provides facilities for the following games and sports

SL NO	Description	Details
01.	Total Area of the Play Ground	9Acres
02.	Details of outdoor games available	01. Badminton Court
		02. Ball Badminton Court
		03. Basketball Court
		04. Cricket Oval
		05. Football Field
		06. Handball Court
		07. Hockey Field
		08. Kabaddi Court
		09. Kho-Kho Court

SL NO	Description	Details
		10. Tennis Court
		11. Volleyball Court
		12. 400 Mts Non standard Track
03.	Details of indoor games available	01. Chess
		02. Carom
		03. Table Tennis
04.	Details of gymnasium available	Available

SOFT SKILLS DEVELOPMENT FACILITIES

Soft skills are attributes that enable the students to engage in meaningful interactions with others.In Order to meet the jobs require teamwork, it's important to possess soft skills to enhance your employability and achieve the students dream job. We are providing the Value added Soft Skills Programmes and also we are educating the following Soft Skills to develop them in a better way.

TOPICS:

Grammar & Vocabulary

Listening & Reading Skills

Speech Skills

Writing Skills

Facing Interviews & Group Discussions

Verbal and Non Verbal Communication

Aptitude Test

Conceptual Test

Analytical Test

Mathematical Test

Practical Test

Oral Communication

Internal Continuous Evaluation (CIE) system and place & Student's assessment of faculty, system in place:

The Institute is affiliated to Anna University, Chennai and follows the Examination pattern of the university. Anna University guidelines are strictly adhered to with respect to evaluation process. There are three Internal tests conducted. The schedules of internal assessments are communicated to students and faculty in the beginning of the semester through institute academic calendar which is prepared based on the university academic calendar.

The institute has reformed the continuous internal evaluation system from faculty centric to student centric. The Institute Exam cell framed guidelines for conducting the CIE in line with calendar of the Affiliate University and the Institutions. As per the guidelines, the following reforms have been carried out effectively conducting CIE:

Scheduling of Internal Examination, Seating arrangements, hall invigilators listed for every examination.
Preparing the question paper for the internal examination in the prescribed pattern based on Knowledge level.
Scrutiny of the prepared question paper is carried out by HoD/ Subject expert to ensure
quality of the Question paper.
Monitoring the attendance of the students for the Online Examination through CISCO WEBEX or ZOOM.
Internal Assessment has to be carried out within the stipulated time.
After completion of the online internal examination, the students will submit the answer sheets in Google classroom. the faculty evaluate the answer scripts and marks have been published in google classroom itself.
Result review meetings are conducted with result analysis and the remedial actions for further improvements are arrived after discussion with faculty, HoD and Principal in CISCO WEBEX or ZOOM.
Upload of assessment marks in university web portal and subsequently communicated to parents.

The evaluation for theory courses are assessed in direct mode (80%) covering both internal and university examinations and indirect (20%) covers survey.

The evaluation for laboratory courses are assessed in the similar pattern followed for theory courses. For each laboratory sessions, the student is assessed through viva questions, observations.

The evaluation for project course is assessed by conducting periodical project reviews covering key parameters like problem formulations , understanding of the project, presentation skills, communication of ideas , technical knowledge , team work and project management. Major project consists of 100 marks. The project review committee organizes review meetings to assess the progress of all the project batches via CISCO WEBEX or ZOOM.

Performance of the students in Internal Assessment is used for Faculties to identify slow and advanced learners in their respective subjects. Slow Learners are encouraged to improve their performance in future by counseling. Counseling Sessions are used to sort out the personal issues, academic and non-academic problems.

The institute believes firmly in continuous evaluation of the students for their sustained performance. Hence a structured evaluation process has been designed and implemented. The tests are prepared and conducted as per the University examination pattern.

Impact:

No pen and paper each time students appearing the test.

The online examination through the CISCO WEBEX or ZOOM reduces the time.

The students get the better feedback of the online test.

It transforms the examination towards the digital mode.

Resources Required:

Computer/Laptop/Mobile.

Internet connection

Internal Continuous Evaluation (CIE) system and place & Student's assessment of faculty, system in place:

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Internet connection

ACADEMIC CALENDER OF THE UNIVERSITY

Date: 10.11.2021

CENTRE FOR ACADEMIC COURSES

ANNA UNIVERSITY: : CHENNAI – 600 025

ACADEMIC SCHEDULE FOR NON-AUTONOMOUS AFFILIATED COLLEGES

November 2021 – March 2022 (SEMESTER I)

PG (FT) Degree Programmes

Sl. No	Programme	Semester	Commencement of Classes	Last working day	Commencement of Practical Examinations	Commencement of End Semester Examinations
1.	M.B.A.	I	15.11.2021	01.03.2022	03.03.2022	14.03.2022
2.	M.B.A. (5 Yrs-Integrated)	I				

RE-OPENING DAY FOR THE NEXT SEMESTER: 06.04.2022 (Wednesday)

NOTE:

1. The Theory and Practical Examination schedules will be published in due course. (Practical Examinations will be conducted before the theory examinations).
2. If necessary, loss of classes due to various curricular / co-curricular activities of the department / college may be compensated by conducting classes on Saturdays.

DIRECTOR
ACADEMIC COURSES

DAC - SB

Date: 27.07.2021

CENTRE FOR ACADEMIC COURSES

ANNA UNIVERSITY: : CHENNAI – 600 025

ACADEMIC SCHEDULE FOR NON AUTONOMOUS AFFILIATED COLLEGES

August 2021 – December 2021 (ODD SEMESTER)*

UG & PG Programmes

Sl. No.	Programme	Semester	Commencement of Classes	Last working day	Commencement of Practical Examinations	Commencement of End Semester Examinations
1.	B.E. / B.Tech.(Full-Time)	III, V, VII	18.08.2021	30.11.2021**	02.12.2021	13.12.2021
2.	B.E. / B.Tech (Part-Time)	III, V, VII				
3.	B.Arch. (Full-Time)	III, V, VII, IX				
4.	M.C.A. (Full-Time)	V				
5.	M.Sc (5 Yrs-Integrated)	V, VII, IX				
6.	M.B.A. (5 Yrs-Integrated)	V, VII, IX				

* As per the directives of the Government of Tamil Nadu, the classes will be conducted in ONLINE mode

RE - OPENING DAY FOR THE NEXT SEMESTER: 19.01.2022 (Wednesday)

NOTE:

1. The Theory and Practical Examination schedules will be published in due course (Practical Examinations will be conducted before the theory examinations).
2. If necessary, loss of classes due to various curricular / co-curricular activities of the department / college may be compensated by conducting classes on Saturdays.

** In order to ensure minimum no. of working days, the following 7 Saturdays are declared as working days.

Sl. No.	Working Days (Saturdays)	Time Table of the Week Day to be Followed
1.	28.08.2021	Friday
2.	11.09.2021	Monday
3.	25.09.2021	Friday
4.	09.10.2021	Thursday
5.	23.10.2021	Friday
6.	06.11.2021	Tuesday
7.	20.11.2021	Thursday

27.07.2021

DIRECTOR
ACADEMIC COURSES

DAC - SB

Date: 21.09.2021

CENTRE FOR ACADEMIC COURSES

ANNA UNIVERSITY: : CHENNAI – 600 025

ACADEMIC SCHEDULE FOR NON AUTONOMOUS AFFILIATED COLLEGES

September 2021 – December 2021 (ODD SEMESTER – III Semester)

PG (FT) Degree Programmes

Sl. No	Programme	Semester	Commencement of Classes	Last working day	Commencement of Practical Examinations	Commencement of End Semester Examinations
1.	M.B.A.(FT)	III	27.09.2021	31.12.2021**	03.01.2022	19.01.2022
2.	M.B.A. (5 Yrs-Integrated)	III				
3.	M.E. / M. Tech. / M. Arch.(FT)	III				

RE-OPENING DAY FOR THE NEXT SEMESTER: 14.02.2022 (Monday)

- Theory and Practical Examination schedules will be published in due course. (Practical Examinations will be conducted before the theory examinations).

** In order to ensure minimum no. of working days, the following Saturdays are declared as working days.

Sl. No.	Working Days (Saturdays)	Time Table of the Week Day to be Followed
1.	09.10.2021	Thursday
2.	23.10.2021	Friday
3.	30.10.2021	Tuesday
4.	06.11.2021	Thursday
5.	13.11.2021	Monday
6.	20.11.2021	Tuesday
7.	27.11.2021	Wednesday
8.	04.12.2021	Thursday
9.	11.12.2021	Friday
10.	18.12.2021	Monday

21.9.2021

DIRECTOR
ACADEMIC COURSES

DAC - SB

I. **UG and PG Odd Higher Semester (Except Semester III M.E./ M. Tech./M. Arch.(FT)/ M.B.A./M.B.A. (5 Yrs-Integrated) / M.C.A. (FT)).**

Sl. No.	Programme	Semester	Last working day		Commencement of Practical Examinations		Commencement of End Semester Examinations	
			Existing	Revised	Existing	Revised	Existing	Revised
1.	B.E. / B.Tech.(FT)	III, V, VII	30.11.2021	20.01.2022	02.12.2021	03.01.2022	13.12.2021	21.01.2022
2.	B.E. / B.Tech (Part-Time)	III, V, VII						
3.	B.Arch. (FT)	III, V, VII, IX						
4.	M.C.A. (FT)	V						
5.	M.Sc (5 Yrs-Integrated)	V, VII, IX						
6.	M.B.A. (5 Yrs-Integrated)	V, VII, IX						

II. **Semester III - M.E./ M. Tech./M. Arch.(FT)/ M.B.A./M.B.A. (5 Yrs-Integrated)**

Sl. No.	Programme	Semester	Last working day		Commencement of Practical Examinations		Commencement of End Semester Examinations	
			Existing	Revised	Existing	Revised	Existing	Revised
1.	M.B.A.(FT)	III	31.12.2021	20.01.2022	03.01.2022	03.01.2022	19.01.2022	21.01.2022
2.	M.B.A. (5 Yrs-Integrated)	III						
3.	M.E./ M.Tech. / M. Arch.	III						

III. **Semester III - M.C.A. (FT)**

Sl. No.	Programme	Semester	Last working day		Commencement of Practical Examinations		Commencement of End Semester Examinations	
			Existing	Revised	Existing	Revised	Existing	Revised
1.	M.C.A.(FT)	III	06.01.2022	20.01.2022	08.01.2022	03.01.2022	24.01.2022	21.01.2022

REGISTRAR i/c

Copy to:

1. PS to Vice Chancellor
2. PA to Registrar
3. The Chairpersons, Faculty of Civil / Mechanical / Electrical / ICE / Technology / Management Sciences / S&H / Architecture & Planning, AU, Ch – 25.
4. Office of the Controller of Examinations
5. The Stock File, CAC.

ASSESMENT SCHEDULE

ANNA UNIVERSITY :: CHENNAI 600 025

Internal Assessment Schedule for Non Autonomous Affiliated Institutions

Period : November 2021 – March 2022 (ODD Semester – First Semester) Examinations

B.E./B.Tech – Full Time / Part Time Programmes (R-2021)

Report No	Report Period	Test Period	Report Entry Period
I	22-11-2021 – 12-01-2022	03-01-2022 – 12-01-2022	12-01-2022 -- 21-01-2022
II	13-01-2022 -- 08-03-2022	25-02-2022 – 08-03-2022	08-03-2022 -- 09-03-2022

Period : November 2021 – March 2022 (ODD Semester – First Semester) Examinations

B.Arch – Programme (R-2021)

Report No	Report Period	Test Period	Report Entry Period
I	29-11-2021 – 31-12-2021	21-12-2021 – 31-12-2021	31-12-2021 – 10-01-2022
II	03-01-2022 -- 09-02-2022	31-01-2022 – 09-02-2022	09-02-2022 – 18-02-2022
III	10-02-2022 -- 15-03-2022	07-03-2022 – 15-03-2022	15-03-2022 – 16-03-2022

Saturdays may be included as working days to make good the Shortages, if any.

27/12/21

CONTROLLER OF EXAMINATIONS

ANNA UNIVERSITY:: CHENNAI 600 025

Internal Assessment Schedule for Non Autonomous Affiliated Institutions

September - December 2021 - For PG (FT) - Programmes (ODD SEMESTER) – III Semester

M.B.A.(FT) / M.B.A. (5 Yrs-Integrated) / M.E./M.Tech./M.Arch.(FT)

Report No	Report Period	Test Period	Report Entry Period
I	27-09-2021 – 22-10-2021	----	22-10-2021 – 28-10-2021
II	23-10-2021 -- 15-11-2021	10-11-2021 -- 15-11-2021	15-11-2021 -- 22-11-2021
III	16-11-2021 -- 07-12-2021	02-12-2021 -- 07-12-2021	07-12-2021 --13-12-2021
IV	08-12-2021 -- 31-12-2021	24-12-2021 -- 31-12-2021	31-12-2021 -- 03-01-2022

Saturdays may be included as working days to make good the Shortages, if any.

16/10/2021

CONTROLLER OF EXAMINATIONS

16/10/2021

16-10-2021

ANNA UNIVERSITY:: CHENNAI 600 025

Internal Assessment Schedule for Non Autonomous Affiliated Institutions

August - December 2021 - For all UG/PG - Programmes (ODD SEMESTER) – Except M.C.A 2 Years

Report No	Report Period	Test Period	Report Entry Period
I	18-08-2021 – 13-09-2021	----	13-09-2021 – 18-09-2021
II	14-09-2021 – 07-10-2021	01-10-2021 – 07-10-2021	07-10-2021 -- 13-10-2021
III	08-10-2021 – 05-11-2021	29-10-2021 – 05-11-2021	05-11-2021 --11-11-2021
IV	06-11-2021 – 30-11-2021	23-11-2021 – 30-11-2021	30-11-2021 -- 02-12-2021

Saturdays may be included as working days to make good the Shortages, if any.

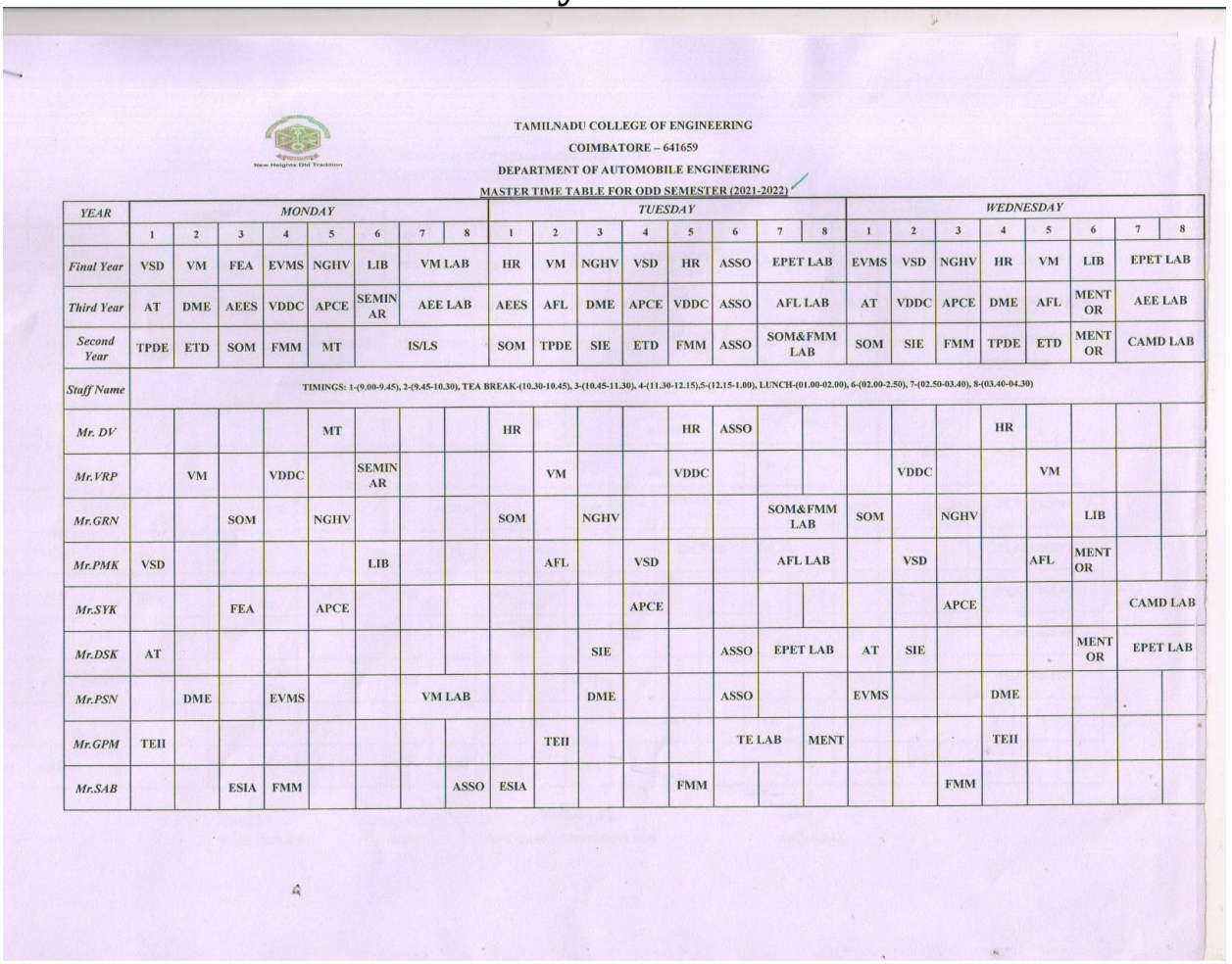
01/09/2021

CONTROLLER OF EXAMINATIONS

01/09/2021

01-09-2021

Time table for the academic year



TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641659
DEPARTMENT OF AUTOMOBILE ENGINEERING
MASTER TIME TABLE FOR ODD SEMESTER (2021-2022)

YEAR	MONDAY								TUESDAY								WEDNESDAY							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Final Year	VSD	VM	FEA	EVMS	NGHV	LIB	VM LAB		HR	VM	NGHV	VSD	HR	ASSO	EPET LAB		EVMS	VSD	NGHV	HR	VM	LIB	EPET LAB	
Third Year	AT	DME	AEES	VDDC	APCE	SEMINAR	AEE LAB		AEES	AFL	DME	APCE	VDDC	ASSO	AFL LAB		AT	VDDC	APCE	DME	AFL	MENTOR	AEE LAB	
Second Year	TPDE	ETD	SOM	FMM	MT	IS/LS			SOM	TPDE	SIE	ETD	FMM	ASSO	SOM&FMM LAB		SOM	SIE	FMM	TPDE	ETD	MENTOR	CAMD LAB	
Staff Name	TIMINGS: 1-(9.00-9.45), 2-(9.45-10.30), TEA BREAK-(10.30-10.45), 3-(10.45-11.30), 4-(11.30-12.15),5-(12.15-1.00), LUNCH-(01.00-02.00), 6-(02.00-2.50), 7-(02.50-03.40), 8-(03.40-04.30)																							
Mr. DV					MT				HR				HR	ASSO						HR				
Mr.VRP		VM		VDDC		SEMINAR				VM			VDDC					VDDC			VM			
Mr.GRN			SOM		NGHV				SOM		NGHV				SOM&FMM LAB		SOM		NGHV			LIB		
Mr.PMK	VSD					LIB				AFL		VSD			AFL LAB			VSD			AFL	MENTOR		
Mr.SYK			FEA		APCE							APCE							APCE				CAMD LAB	
Mr.DSK	AT										SIE			ASSO	EPET LAB		AT	SIE				MENTOR	EPET LAB	
Mr.PSN		DME		EVMS			VM LAB				DME			ASSO			EVMS			DME				
Mr.GPM	TEII									TEII				TE LAB		MENT				TEII				
Mr.SAB			ESIA	FMM				ASSO	ESIA				FMM						FMM					

TAMILNADU COLLEGE OF ENGINEERING
COIMBAEEORE – 641659
DEPARTMENT OF AUTOMOBILE ENGINEERING
MASTER TIME TABLE FOR ODD SEMESTER (2021-2022)

IR	THURSDAY								FRIDAY								SATURDAY							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Year	VSD	EVMS	FEA	VM	HR	MENTOR	VM LAB		FEA	NGHV	FEA	VSD	EVMS	TECHNICAL SEMINAR			VM	HR	EVMS	FEA	NGHV	PLACEMENT		
Year	APCE	AT	AFL	AEES	DME	P.COMMUNICATION			DME	AFL	AEES	AT	VDDC	LIB	AFL LAB		AFL	APCE	AT	VDDC	AEES	PLACEMENT		
nd r	FMM	SOM	ETD	SIE	TPDE	LIB	CAMD LAB		ETD	FMM	TPDE	MT	SOM	LIB	SOM&FMM LAB		ETD	TPDE	SOM	FMM	MT	PLACEMENT		
lame	TIMINGS: 1-(9.00-9.45), 2-(9.45-10.30), TEA BREAK-(10.30-10.45), 3-(10.45-11.30), 4-(11.30-12.15),5-(12.15-1.00), LUNCH-(01.00-02.00), 6-(02.00-2.50), 7-(02.50-03.40), 8-(03.40-04.30)																							
DV					HR							MT		TECHNICAL SEMINAR				HR			MT			
RP				VM									VDDC	TECHNICAL SEMINAR			VM			VDDC				
RN		SOM				LIB				NGHV			SOM		SOM&FMM LAB				SOM		NGHV	PLACEMENT		
MK	VSD		AFL							AFL		VSD			AFL LAB		AFL					PLACEMENT		
YK	APCE		FEA				CAMD LAB		FEA		FEA			LIB				APCE		FEA		PLACEMENT		
SK		AT		SIE								AT		LIB					AT			PLACEMENT		
SN		EVMS			DME	MENTOR	VM LAB		DME				EVMS						EVMS			PLACEMENT		
PM					TEII						TEII			TE LAB			TEII							
AB	FMM			ESIA						FMM			ESIA					ESIA		FMM				ASSO

TIME TABLE I/C | HOD | TIME TABLE CO-ORDINATOR | PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING COIMBATORE – 641659
DEPARTMENT OF CIVIL ENGINEERING
MASTER TIME TABLE - ACADEMIC YEAR 2021-2022 (ODD SEM)

DAY	MONDAY								TUESDAY								WEDNESDAY							
HR	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
FINAL	ECV	MSWM	SD&D	RAHE	GBD	P.W			MSWM	GBD	MSWM	SD&D	ECV	P.W			RAHE	SD&D	GBD	ECV	RAHE	I.T		
THIRD	DRCCE	SA I	WSE	DM	E&A	S.M.Lab			SA I	FE	DRCCE	E&A	WSE	WWA Lab			FE	WSE	DM	DRCCE	SA I	Survey Camp		
SECON	TPDE	EG	SUR	FM	SOM-I	IPS LAB			SOM-I	TPDE	EG	SUR	CM	C.M.Lab			FM	SOM-I	FM	TPDE	SUR	Survey lab		
M.E-II YR	DOB	DOSCCS	EADS	LIB	ASSO	P.T			DOB	EADS	DOSCCS	SEMIN	EADS	P.W-PHASE-I			DOSCCS	SEMIN	SEMIN	DOSCCS	DOB	P.W-PHASE-I		

TIMINGS :- 1-(9.00-9.45) 2-(9.45-10.30) Br-(10.30-10.45) 3-(10.45-11.30) 4-(11.30-12.15) 5-(12.15-1.00) LB-(1.00-2.00) 6-(2.00-2.50) 7-(2.50-3.40) 8-(3.40-4.30)

Dr.MSI	III YR				IV YR	IV YR			IV YR	III YR			IV YR				IV YR	III YR		II YR M.E				
Dr.VK		II YR			III YR	III YR				II YR	III YR						IV YR	II YR M.E						
L.P.Y	IV YR	III YR		II YR M.E		II YR M.E			III YR				IV YR	II YR M.E						IV YR	III YR	IV YR		
GSS			II YR	III YR								II YR							III YR		II YR	II YR		
ASR			III YR	II YR									III YR	II YR			II YR	III YR	II YR					
RKA	II YR M.E		IV YR						II YR M.E			IV YR	II YR	III YR				IV YR			II YR M.E			
SDTR				IV YR						III YR		II YR M.E					III YR		II YR M.E		IV YR			
KBL		IV YR	II YR M.E						IV YR	II YR M.E	IV YR		II YR M.E											
SGK		II YR M.E			II YR				II YR		II YR M.E						II YR M.E	II YR		II YR M.E		III YR		
CRS	II YR					II YR				II YR										II YR				

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING COIMBATORE – 641659
DEPARTMENT OF CIVIL ENGINEERING
MASTER TIME TABLE - ACADEMIC YEAR 2021-2022(ODD SEM)

DAY	THURSDAY								FRIDAY								SATURDAY							
HR	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
FINAL	SD&D	RAHE	ECV	GBD	MS WM	I.T			GBD	ECV	RAHE	MS WM	SD&D	P.W			IT		P.W			SEMI	MENT	T & P
THIRD	E&A	DM	E&A	SA I	FE	S.M.Lab			WSE	E&A	FE	DR CCE	DM	WWA Lab			DM	DRC CE	SA I	WSE	FE	SEMI	MENT	T & P
SECON	SUR	FM	CM	EG	TPDE	C.M.Lab			CM	SUR	TPDE	SO M-I	FM	Survey Lab			EG	TPDE	SO M-I	CM	EG	LIB	T&P	ASSO
M.E-II YR	EADS	DOB	SEMI	DOB	LIB	SEMINAR			EADS	DOS CCS	SEMIN	LIB	EADS	P.T			DOS CCS	DOB	SEMINAR		LIB	SEMI	MENT	T & P
TIMINGS :- 1-(9.00-9.45) 2-(9.45-10.30) Br-(10.30-10.45) 3-(10.45-11.30) 4-(11.30-12.15) 5-(12.15-1.00) LB-(1.00-2.00) 6-(2.00-2.50) 7-(2.50-3.40) 8-(3.40-4.30)																								
Dr.MSI				IV YR					IV YR			III YR		IV YR				III YR	IV YR			II YR M.E		
Dr.VK	III YR		III YR	II YR		III YR				III YR	II YR M.E						II YR				II YR			
L.P.Y			IV YR	III YR		IV YR				IV YR				II YR M.E			IV YR		III YR					II YR
GSS	II YR	III YR								II YR			III YR	II YR			III YR					II YR	IV YR	
ASR		II YR				II YR			III YR				II YR							III YR			III YR	
RKA	IV YR	II YR M.E	II YR	II YR M.E					II YR				IV YR	III YR				II YR M.E		II YR		III YR	II YR M.E	II YR M.E
SDTR		IV YR	II YR M.E		III YR	II YR M.E					IV YR								II YR M.E		III YR			IV YR
KBL	II YR M.E				IV YR				II YR M.E		III YR	IV YR	II YR M.E										II YR	III YR
SGK										II YR M.E		II YR					II YR M.E		II YR			IV YR		
CRS					II YR						II YR							II YR						

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE - 641 659
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MASTER TIME TABLE
FOR THE ACADEMIC YEAR 2021 - 2022
ODD SEMESTER

CLASS	MONDAY								TUESDAY								WEDNESDAY							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
II M.E (CSE)	SQA	BIC	MAD	SQA	BIC	SQA	MAD	BIC	BIS	SQA	BIS	MAD	MAD	....PROJECT PHASE -I....			....PROJECT PHASE -I....							
IV YEAR	POM	CNS	HCI	SPM	CC	....CC LAB....			ESIA	SPM	CC	POM	HCI	...CNS LAB....			SPM	CC	ESIA	HCI	POM	....CNS LAB...		
III YEAR	GIS	MP	TOC	ANT	CN	....MP LAB....			TOC	ANT	CN	GIS	TOC	...CN LAB....			MP	CN	OOAD	MP	ANT	....OOAD LAB...		
II YEAR	DS	OOPS	DM	CE	DPSD	....OOPS LAB...			OOPS	CE	DPSD	DS	DM	INTERPRESONAL LAB			DM	DPSD	OOPS	DS	CE	...DS/DIGITAL LAB...		
TIMINGS : 1-9:00 - 9:45, 2-9:45-10:35, TEA BREAK - 10:35-10:50, 3-10:50-11:40, 4-11:40-12:30, 5-12:30-1:20 LUNCH BREAK-1:20-2:15, 6-2:15-3:00, 7-3:00-3:45, 8-3:45-4:30																								
STAFF NAME																								
Dr.M.KARTHIKEYAN	SQA			SQA		SQA				SQA														
Dr.S.LATHA SHANMUGA VADIVU		BIC			BIC			BIC	BIC		BIC													
Dr.A.S.SHANTHI			MAD				MAD		ESIA			MAD	MAD	....PROJECT PHASE -I....					ESIA					
Ms.V.SARANYA																			OOAD			....OOAD LAB...		
Mrs.N.SATHYA					FDS II ECE									...FDS LAB....II ECE					FDS II ECE					
Mrs.P.DIVYA					CN						CN			...CN LAB....				CN						
Mr.C.SATHISH KUMAR		OOPS III EEE II ICE				....OOPS LAB... III EEE II ICE			OOPS III EEE II ICE										OOPS III EEE II ICE					
Ms.R.KOKILA	POM		TOC						TOC			POM	TOC								POM			
Mr.PONNEELAVIGNESH		MP				....MP LAB...											MP			MP				
Ms.G.KOKILA		OOPS				....OOPS LAB...			OOPS										OOPS					
Mrs.R.SIVARANJANI		CNS												...CNS LAB....								...CNS LAB....		
Mrs.R.SHENBAGAVALLI	DS											DS								DS		...DS LAB...		
Mr.R.GANESH	GIS				CC	....CC LAB....					CC	GIS						CC						
Mrs.T.RAMYA		PSPP				...PSPPP LAB..SEC A			PSPP									PSPP				...PSPPP LAB..SEC A		

CLASS	THURSDAY								FRIDAY								SATURDAY							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
II M.E (CSE)	.....PROJECT PHASE -I....								.....PROJECT PHASE -I....								.....PROJECT PHASE -I....							
IV YEAR	CC	POM	SPM	ESIA	CNS	.....CC LAB....			HCI	ESIA	POM	CNS	ESIA	T&P	T&P	LIB	CNS	CC	CNS	HCI	SPM	ASSO	ASSO	MENT
III YEAR	OOAD	CN	ANT	OOAD	GIS	.....MP LAB....			ANT	GIS	OOAD	TOC	MP	.....CN LAB....			CN	TOC	MP	GIS	OOAD	.....OOAD LAB....		
II YEAR	DPSD	DM	DM	OOPS	DS	T&P	ASSO	MENT	CE	DPSD	DS	CE	OOPS	...DIGITAL/DS LAB...			DM	DS	CE	OOPS	DPSD	.....OOPS LAB....		
STAFF NAME																								
Dr.M.KARTHIKEYAN																								
Dr.S.LATHA SHANMUGA VADIVU																								
Dr.A.S.SHANTHI				ESIA						ESIA			ESIA											
Ms.V.SARANYA	OOAD			OOAD							OOAD										OOAD	.....OOAD LAB....		
Mrs.N.SATHYA		FDS II ECE							FDS II ECE					...FDS LAB....II ECE						FDS II ECE				
Mrs.P.DIVYA		CN												.....CN LAB....			CN							MENT
Mr.C.SATHISH KUMAR				OOPS III EEE II ICE		T&P							OOPS III EEE II ICE							OOPS III EEE II ICE		....OOPS LAB... III EEE II ICE		
Ms.R.KOKILA		POM									POM	TOC		T&P				TOC				ASSO		
Mr.PONNEELAVIGNESH						.....MP LAB....							MP						MP					
Ms.G.KOKILA				OOPS		ASSO							OOPS							OOPS		.....OOPS LAB....		
Mrs.R.SIVARANJANI					CNS							CNS			T&P		CNS		CNS					
Mrs.R.SHENBAGAVALLI					DS			MENT			DS			...DS LAB...				DS				ASSO		
Mr.R.GANESH	CC				GIS	.....CC LAB....				GIS								CC		GIS				
Mrs.T.RAMYA		PSPP				...PSPPP LAB..SEC C						PSPP				LIB						...PSPPP LAB..SEC C		

TIMETABLE I/C	TT CO-ORDIANTOR	HOD	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MASTER TIME TABLE FOR ACADEMIC YEAR 2021 - 2022 ODD SEMESTER

	Monday								Tuesday								Wednesday							
	9.00 - 9.45	9.45 - 10.30	10.45 - 11.30	11.30 -. 12.15	12.15 - 1.00	2.00 - 2.50	2.50 - 3.40	3.40 - 4.30	9.00 - 9.45	9.45 - 10.30	10.45 - 11.30	11.30 -. 12.15	12.15 - 1.00	2.00 - 2.50	2.50 - 3.40	3.40 - 4.30	9.00 - 9.45	9.45 - 10.30	10.45 - 11.30	11.30 -. 12.15	12.15 - 1.00	2.00 - 2.50	2.50 - 3.40	3.40 - 4.30
IV Year	DM	AME	AWN	OCN	ESIA	Embedded lab			AWN	OCN	DM	ERTS	AME	ADV. COMMUN. LAB			ESIA	DM	ERTS	AWN	ERTS	Embedded lab		
III Year	DTSP	DC	CA	BBMI	CN	DSP LAB			CA	DTSP	CN	HR	DC	CN LAB			DC	HR	DTSP	CA	BBMI	CS LAB		
II Year	Maths	CS	SS	DE	DS	ENGLISH LAB			DE	Maths	CS	SS	ECI	DS LAB			CS	EC I	DS	Maths	SS	EC 1 LAB		

Sivakumar			IV CSE										IV CSE							IV CSE				
s.T.Arachelvi				II ECE	II CSE				II ECE		II CSE							II CSE						
.T.Kannan			II ECE		IV ECE							II ECE					IV ECE				II ECE			
.K.Ramkarthick kumar												IV ECE	II ECE					II ECE	IV ECE		IV ECE			
.Thiruvengadam	III ECE					III ECE - DSP LAB				III ECE									III ECE					
.V.Kanimozhi				IV ECE						IV ECE				ADV. COMMUN. LAB										
s R.Gokila			III ICE							III ICE			II ICE	III EEE CONT. & INSTRU. LAB				II ICE			III ICE			
.Darthy Rabeka				II CSE						II CSE											II CSE	II CSE DPSD LAB		
.Lokesh			IV ECE			Embedded lab			IV ECE											IV ECE		Embedded lab		
.V.Thangavel												III ECE						III ECE				EC 1 LAB		
s.G.Divyamohanapriya		III ECE											III ECE				III ECE					III ECE CS LAB		
.Priyadharshini		IV ICE			III EEE	II ICE & EEE LAB						III EEE						III EEE		IV ICE				

Timetable Incharge | T.T. Coordinator | for HOD | Principal

	Thursday								Friday								Saturday							
	9.00 - 9.45	9.45 - 10.30	10.45 - 11.30	11.30 -. 12.15	12.15 - 1.00	2.00 - 2.50	2.50 - 3.40	3.40 - 4.30	9.00 - 9.45	9.45 - 10.30	10.45 - 11.30	11.30 -. 12.15	12.15 - 1.00	2.00 - 2.50	2.50 - 3.40	3.40 - 4.30	9.00 - 9.45	9.45 - 10.30	10.45 - 11.30	11.30 -. 12.15	12.15 - 1.00	2.00 - 2.50	2.50 - 3.40	3.40 - 4.30
IV Year	AME	ESIA	OCN	DM	AWN	ADV. COMMUN. LAB			OCN	ERTS	AME	ESIA	DM				ERTS	AWN	ESIA	AME	OCN	SEMINAR & ASSOCIATION		
III Year	CN	CA	BBMI	DTSP	HR	DSP LAB			BBMI	CN	HR	DC	CA	CS LAB			HR	BBMI	DC	CN	DTSP	CN LAB		
II Year	EC I	DS	DE	CS	DE	EC 1 LAB			DS	SS	Maths	EC I	CS	DS LAB			SS	DE	EC I	DS	Maths	ASSOCIATION, TRAINING & PLACEMENT		

akumar									IV CSE									II ECE			II CSE			
Arachelvi	II CSE		II ECE		II ECE					II CSE							II ECE		IV ECE					
Kannan		IV ECE								II ECE		IV ECE					IV ECE		II ECE					
Ramkarthick kumar	II ECE									IV ECE		II ECE									III ECE			
iruvengadam				III ECE		III ECE - DSP LAB															IV ECE			
Kanimozhi			IV ECE			ADV. COMMUN. LAB			IV ECE															
.Gokila			II ICE	III ICE					III ICE					III EEE CONT. & INSTRU. LAB			II ICE							
arthy Rabeka									II CSE			II CSE		II CSE DPSD LAB					II CSE					
ikesh					IV ECE												III ECE		IV ECE					
Thangavel					III ECE	EC 1 LAB					III ECE													
.Divyamohanapriya												III ECE		III ECE CS LAB					III ECE					
iyadharshini			IV ICE						IV ICE		III EEE			II ICE & EEE LAB			III EEE				IV ICE			

T. Prabhu
Timetable Incharge

T.T. Coordinator

T. Prabhu
HOD

Principal

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE - 641 659

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MASTER TIME TABLE

(FOR THE ACADEMIC YEAR 2021 - 2022 ODD SEMESTER)

CLASS	MONDAY								TUESDAY								WEDNESDAY							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
IV EEE	DM	PST	AMI	PSOC	RES	PSS LAB			PSOC	AMI	DM	HVE	PST	RES LAB			AMI	DM	PSOC	RES	HVE	PSS LAB		
III EEE	PSA	OOPS	PE	BMI	DSP	OOPS LAB			OOPS	PE	MP&MC	DSP	PSA	C&I LAB			MP&MC	DSP	OOPS	PSA	BMI	T&P	LIB	MENT
II EEE	TPDE	PPE	EMT	EDC	DLC	ES LAB			EMT	TPDE	DLC	PPE	EM-I	EM-1 LAB			PPE	EMT	EM-I	TPDE	EDC	LIB	T&P	
TIMINGS : 1-9:00-9:45, 2-9:45-10:30, 3-10:45-11.30, 4-11:30-12:15, 5-12:15-1:00, 6-2:00-2:50, 7-2:50- 3:40, 8-3:40-4:30																								
Dr.GSK		III ICE							III ICE			IV ICE									IV ICE			
Mrs.GRA	III EEE			IV EEE		IV EEE			IV EEE				III EEE						IV EEE	III EEE		IV EEE		
Mr.SMDN	IV EEE, ECE & ICE	II EEE									IV EEE, ECE & ICE	II EEE					II EEE	IV EEE, ECE & ICE				III EEE		
Mr.TSK												IV EEE	II EEE						II EEE		IV EEE			
Mr.MPK			III EEE		IV EEE					III EEE				II MECH & EEE						IV EEE		III EEE		
Mr.SVK			II MECH						II MECH		III EEE & ICE			III ICE			III EEE & ICE	II MECH					II EEE	
Ms.MVRA			III AUTO		II EEE & ICE		III AUTO		III AUTO		II EEE & ICE												III AUTO	
Mrs.BCJ		IV EEE	II EEE						II EEE				IV EEE					II EEE				III EEE		
Mr.PSV			IV EEE & ICE	II EEE & ICE						IV EEE & ICE				IV EEE			IV EEE & ICE				II EEE & ICE			III EEE

TIME TABLE I/C

HOD

TT CO-ORDINATOR

PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE - 641 659

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MASTER TIME TABLE

(FOR THE ACADEMIC YEAR 2021 - 2022 ODD SEMESTER)

CLASS	THURSDAY								FRIDAY								SATURDAY							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
IV EEE	PST	HVE	RES	DM	AMI	RES LAB			HVE	RES	PST	PSOC	DM	LIB	T&P		RES	AMI	HVE	PST	PSOC	ASSO		MENT
III EEE	PE	MP&MC	BMI	OOPS	PSA	PC LAB			BMI	MP&MC	DSP	PE	OOPS	C&I LAB			DSP	BMI	PSA	MP&MC	PE	OOPS LAB		
II EEE	DLC	EDC	PPE	EM-I	TPDE	EM-I LAB			EDC	DLC	TPDE	EMT	EM-I	ES LAB			EM-I	TPDE	EDC	DLC	EMT	ASSO		MENT

TIMINGS : 1-9:00-9:45, 2-9:45-10:30, 3-10:45-11.30, 4-11:30-12:15, 5-12:15-1:00, 6-2:00-2:50, 7-2:50- 3:40, 8-3:40-4:30

Dr.GSK	IV ICE		III ICE							IV ICE		III ICE							IV ICE		III ICE			
Mrs.GRA				III EEE								IV EEE		IV EEE					III EEE		IV EEE			
Mr.SMDN			II EEE	IV EEE, ECE & ICE									IV EEE, ECE & ICE									IV EEE		
Mr.TSK		IV EEE		II EEE					IV EEE				II EEE		IV EEE		II EEE		IV EEE					
Mr.MPK	III EEE		IV EEE			II MECH & EEE				IV EEE		III EEE					IV EEE				III EEE	II EEE		
Mr.SVK		III EEE & ICE		II MECH		III ICE				III EEE & ICE			II MECH							III EEE & ICE	II MECH		
Ms.MVRA	II EEE & ICE			III AUTO						II EEE & ICE	III AUTO									II EEE & ICE	III AUTO			
Mrs.BCJ	IV EEE										IV EEE	II EEE								IV EEE	II EEE			IV EEE
Mr.PSV		II EEE & ICE			IV EEE & ICE	IV EEE			II EEE & ICE									IV EEE & ICE	II EEE & ICE					

TIME TABLE I/C HOD TT CO-ORDINATOR PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE - 641 659

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

MASTER TIME TABLE

(FOR THE ACADEMIC YEAR 2021 - 2022 ODD SEMESTER)

CLASS	MONDAY								TUESDAY								WEDNESDAY							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
IV ICE	DM	DIP	AMI	IDN	EI	IA LAB			EI	AMI	DM	IPCI	IDN	ISD LAB			AMI	DM	EI	DIP	IPCI	IA LAB		
III ICE	UOC	PC	AI	II - 2	APCE	II LAB			PC	AI	MP&MC	APCE	II - 2	MP&MC LAB			MP&MC	II - 2	APCE	UOC	AI	II LAB		
II ICE	TPDE	OOPS	EMS	EDC	DLC	OOP LAB			OOPS	TPDE	DLC	EMS	TE	M&T LAB			EMS	TE	OOPS	TPDE	EDC	T&P	MENT	LIB

TIMINGS : 1 - 9:00 - 9:45, 2 - 9:45-10:30, TEA BREAK - 10:30-10:45, 3 - 10:45-11:30, 4 - 11:30-12:15, 5 - 12:15-1:00 LUNCH BREAK - 1:00-2:00, 6 - 2:00-2:50, 7 - 2:50-3:40, 8 - 3:40-4:30

DYJ			II ICE	IV ICE								II ICE	IV ICE				II ICE							
AMA				III ICE									III ICE					III ICE						
GSA	III ICE				IV ICE				IV ICE										IV ICE	III ICE				
NRK														II ICE								II ICE	II ICE	
SSA						III ICE																III ICE		
CSA														IV ICE										II ICE
AMY						IV ICE																IV ICE		

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE - 641 659

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

MASTER TIME TABLE

(FOR THE ACADEMIC YEAR 2021 - 2022 ODD SEMESTER)

CLASS	THURSDAY								FRIDAY								SATURDAY							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
IV ICE	IPCI	IDN	DIP	DM	AMI	ISD LAB			DIP	IPCI	IDN	EI	DM	T&P	LIB	MENT	IDN	AMI	IPCI	EI	DIP	ASSOC		
III ICE	APCE	MP&MC	PC	AI	UOC	MP&MC LAB			AI	MP&MC	II - 2	PC	UOC	LIB	T&P	MENT	II - 2	APCE	UOC	MP&MC	PC	ASSOC		
II ICE	DLC	EDC	TE	OOPS	TPDE	ASSOC			EDC	DLC	TPDE	EMS	OOPS	M&T LAB			TE	TPDE	EDC	DLC	EMS	OOP LAB		

TIMINGS : 1 - 9:00 - 9:45, 2 - 9:45-10:30, TEA BREAK - 10:30-10:45, 3 - 10:45-11:30, 4 - 11:30-12:15, 5 - 12:15-1:00 LUNCH BREAK - 1:00-2:00, 6 - 2:00-2:50, 7 - 2:50-3:40, 8 - 3:40-4:30

DYJ		IV ICE		.							IV ICE	II ICE					IV ICE		.		II ICE			
AMA											III ICE						III ICE							
GSA					III ICE							IV ICE							III ICE	IV ICE				
NRK														II ICE								IV ICE		
SSA						II ICE								III ICE		IV ICE								
CSA						IV ICE									IV ICE	III ICE						III ICE		
AMY														IV ICE	III ICE									

TIMETABLE I/C HOD TT CO-ORDINATOR PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE - 641 659

DEPARTMENT OF MECHANICAL ENGINEERING

MASTER TIME TABLE

(FOR THE ACADEMIC YEAR 2021 - 2022 ODD SEMESTER)

CLASS	MONDAY								TUESDAY								WEDNESDAY							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
IV	PPCE	PPE	ESIA	MTS	UCM	SA LAB		ASSO	ESIA	PPCE	UCM	PPE	ROB	MTS LAB		PROJ	MTS	PPCE	ROBO	ROBO	PPE	TS		LIB
III	TEII	DME	RES	M&M	DOM	KD LAB		T&P	RES	TEII	DOM	DME	M&M	TE LAB		LIB	DOM	RES	M&M	TEII	DME	M&M LAB		ASSO
II	TPDE	ETD	EDC	FMM	MTI	ISLS LAB		LIB	EDC	TPDE	MTI	ETD	FMM	EE LAB		MENT	MTI	EDC	FMM	TPDE	ETD	MT I LAB		PROJ

TIMINGS : 1-9:00 - 9:45, 2-9:45-10:30, TEA BREAK - 10:30-10:45, 3-10.45-11:30, 4-11:30-12:15 , 5-12.15-01.00 LUNCH BREAK-1:00-2:00, 6-2:00-2:50 7-2.50-03.40, 8-03.40-04.30

Dr.PDM					UCM						UCM													
CEO	PPCE			M&M						PPCE			M&M					PPCE	M&M					
LCG		DME			MT-I						MT-I	DME					MT-I				DME			
NS						KD LAB																		PROJ
SAGK		PPE	RES						RES			PPE						RES			PPE			ASSO
PRN		ETD		MTS								ETD					MTS				ETD			
SAB			ESIA	FMM				ASSO	ESIA				FMM						FMM					
TPN					DOM						DOM		ROB				DOM		ROBO	ROBO				
GPM	TEII									TEII				TE LAB		MENT				TEII				
TPU								T&P								LIB						M&M LAB		
RMN								LIB														TS		
PRK														MTS LAB										LIB
TSK																						MT I LAB		
PEN						SA LAB										PROJ								
PDN																								
CRA	TPDE									TPDE										TPDE				
SVK			EDC						EDC									EDC						
BCJ														EE LAB										
KSN						ISLS LAB																		

TIME TABLE I/C HOD TT CO-ORDINATOR PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE - 641 659

DEPARTMENT OF MECHANICAL ENGINEERING

MASTER TIME TABLE

(FOR THE ACADEMIC YEAR 2021- 2022 ODD SEMESTER)

CLASS	THURSDAY								FRIDAY								SATURDAY							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
IV	PPE	UCM	PPE	ESIA	PPCE	SA LAB		MENT	UCM	ROBO	MTS	MTS	ESIA	MTS LAB		T&P	ROBO	ESIA	PPCE	UCM	MTS	TS		ASSO
III	M&M	DOM	DME	RES	TEII	KD LAB		MENT	DME	M&M	TEII	DOM	RES	TE LAB		PROJ	TEII	DME	RES	M&M	DOM	M&M LAB		ASSO
II	FMM	MTI	ETD	EDC	TPDE	EE LAB		ASSO	ETD	FMM	TPDE	T&P	CAMD LAB				ETD	TPDE	MTI	FMM	EDC	MT I LAB		ASSO
	TIMINGS : 1-9:00 - 9:45, 2-9:45-10:30, TEA BREAK - 10:30-10:45, 3-10.45-11:30, 4-11:30-12:15 , 5-12.15-01.00 LUNCH BREAK-1:00-2:00, 6-2:00-2:50 7-2.50-03.40, 8-03.40-04.30																							
Dr.PDM		UCM							UCM											UCM				
CEO	M&M				PPCE					M&M									PPCE	M&M				
LCG		MT-I	DME					MENT	DME									DME	MT-1					
NS						KD LAB																		
SAGK	PPE		PPE	RES									RES						RES					ASSO
PRN			ETD					ASSO	ETD		MTS	MTS					ETD				MTS			ASSO
SAB	FMM			ESIA						FMM			ESIA					ESIA		FMM				ASSO
TRN		DOM								ROBO		DOM					ROBO				DOM			
GPM					TEII						TEII			TE LAB			TEII							
TPU																						M&M LAB		
RMN								MENT								PROJ						TS		
PRK												T&P												
TSK																T&P						MT I LAB		
PEN						SA LAB								MTS LAB										
PDN													CAMD LAB											
CRA					TPDE						TPDE							TPDE						
SVK				EDC																	EDC			
BCJ						EE LAB																		
KSN																								

TIME TABLE I/C

HOD

TT CO-ORDINATOR

PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING

KARUMATHAMPAATI, COIMBATORE – 641659

DEPARTMENT OF AUTOMOBILE ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-22
ODD SEMESTER

DEPARTMENT	AUTOMOBILE ENGG	**ACADEMIC YEAR**	2021-22
CLASS ROOM	D 107	**YEAR, BRANCH & SECTION**	II AUTO
SEMESTER	III	**WITH EFFECT FROM**	18.08.2021

HOUR / DAY	1 (9.00-9.45)	2 (9.45-10.30)	(10.30-10.45)	3 (10.45-11.30)	4 (11.30-12.15)	5 (12.15-1.00)	(1.00-2.00)	6 (2.00-2.50)	7 (2.50-3.40)	8 (3.40-4.30)
MONDAY	TPDE	ETD	TEA BREAK	SOM	FMM	MT	LUNCH	Interpersonal Skills/Listening & Speaking		
TUESDAY	SOM	TPDE		SIE	ETD	FMM		ASSO	SOM and FMM Laboratory	
WEDNESDAY	SOM	SIE		FMM	TPDE	ETD		MENTOR	CAMD Laboratory	
THURSDAY	FMM	SOM		ETD	SIE	TPDE		LIB	CAMD Laboratory	
FRIDAY	ETD	FMM		TPDE	MT	SOM		LIB	SOM and FMM Laboratory	
SATURDAY	ETD	TPDE		SOM	FMM	MT		Placement		

S.NO	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	MA8353	Transforms and Partial Differential Equations	Prof.Ruby sharmila
2	ME8391	Engineering Thermodynamics	Prof.P.Ravichandran
3	CE8395	Strength of Materials for Mechanical Engineers	Prof.GRadhaKrishnan
4	AT8301	Spark Ignition Engines	Prof.D.Suresh Kumar
5	ME8392	Manufacturing Technology	Prof.D.Venkatesh
6	CE8394	Fluid Mechanics and Machinery	Prof.S.Arunbabu
7	CE8381	Strength of Materials and Fluid Mechanics and Machinery Laboratory	Prof.G.RadhaKrishnan
8	ME8381	Computer Aided Machine Drawing	Prof.S.Yaknesh
9	HS8381	Interpersonal Skills/Listening & Speaking	Prof.T.Rajthilak
10	-	Association	Prof.D.Venkatesh
11	-	Mentor	Prof.P.Mohan Kumar
12	-	Library (Thursday)	Prof.GRadhaKrishnan
13	-	Library (Friday)	Prof.D.Suresh Kumar
14	-	Training and Placement	Prof.GRadhaKrishnan/ Prof.P.Mohan Kumar

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING

KARUMATHAMPAATI, COIMBATORE – 641659

DEPARTMENT OF AUTOMOBILE ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-22
ODD SEMESTER

DEPARTMENT	AUTOMOBILE ENGG	**ACADEMIC YEAR**	2021-22
CLASS ROOM	D 108	**YEAR, BRANCH & SECTION**	III AUTO
SEMESTER	V	**WITH EFFECT FROM**	18.08.2021

HOUR / DAY	1 (9.00-9.45)	2 (9.45-10.30)	(10.30-10.45)	3 (10.45-11.30)	4 (11.30-12.15)	5 (12.15-1.00)	(1.00-2.00)	6 (2.00-2.50)	7 (2.50-3.40)	8 (3.40-4.30)
MONDAY	AT	DME	TEA BREAK	AEES	VDDC	APCE	LUNCH	Seminar	AEE Laboratory	
TUESDAY	AEES	AFL		DME	APCE	VDDC		ASSO	AFL Laboratory	
WEDNESDAY	AT	VDDC		APCE	DME	AFL		Mentor	AEE Laboratory	
THURSDAY	APCE	AT		AFL	AEES	DME		Professional Communication		
FRIDAY	DME	AFL		AEES	AT	VDDC		Lib	AFL Laboratory	
SATURDAY	AFL	APCE		AT	VDDC	AEES		Placement		

S.NO.	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	ME8593	Design of Machine Elements	Prof.P.Selvan
2	AT8501	Automotive Transmission	Prof.D.Suresh Kumar
3	AT8502	Automotive Electrical and Electronics Systems	Prof.M.V.Ramya
4	AT8503	Vehicle Design Data Characteristics	Prof.V.R.Palaniappan
5	AT8504	Automotive Fuels and Lubricants	Prof.P.Mohan Kumar
6	OCE551	Air Pollution and Control Engineering	Prof.S.Yaknesh
7	AT8511	Automotive Electrical and Electronics Laboratory	Prof.M.V.Ramya
8	AT8512	Automotive Fuels and Lubricants Laboratory	Prof.P.Mohan Kumar
9	HS8581	Professional Communication	Prof.T.Rajthilak
10	-	Seminar	Prof.V.R.Palaniappan
11	-	Association	Prof.D.Suresh Kumar
12	-	Mentor	Prof.D.Suresh Kumar
13	-	Library	Prof.S.Yaknesh
14	-	Training and Placement	Prof.D.Suresh Kumar/ Prof.S.Yaknesh

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING

KARUMATHAMPAATI, COIMBATORE – 641659

DEPARTMENT OF AUTOMOBILE ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-22
ODD SEMESTER

DEPARTMENT	AUTOMOBILE ENGG	**ACADEMIC YEAR**	2021-22
CLASS ROOM	D 109	**YEAR, BRANCH & SECTION**	IV AUTO
SEMESTER	VII	**WITH EFFECT FROM**	18.08.2021

HOUR / DAY	1 (9.00-9.45)	2 (9.45-10.30)	(10.30-10.45)	3 (10.45-11.30)	4 (11.30-12.15)	5 (12.15-1.00)	(1.00-2.00)	6 (2.00-2.50)	7 (2.50-3.40)	8 (3.40-4.30)
MONDAY	VSD	VM	TEA BREAK	FEA	EVMS	NGHV	LUNCH	LIB	VM Laboratory	
TUESDAY	HR	VM		NGHV	VSD	HR		ASSO	EPET Laboratory	
WEDNESDAY	EVMS	VSD		NGHV	HR	VM		LIB	EPET Laboratory	
THURSDAY	VSD	EVMS		FEA	VM	HR		Mentor	VM Laboratory	
FRIDAY	FEA	NGHV		FEA	VSD	EVMS		Technical Seminar		
SATURDAY	VM	HR		EVMS	FEA	NGHV		Placement		

S.NO.	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	AT8701	Engine and Vehicle Management System	Prof.P.Selvan
2	ME8692	Finite Element Analysis	Prof.S.Yaknesh
3	AT8702	Vehicle Maintenance	Prof.V.R.Palaniappan
4	OAT752	Vehicle Styling and Design	Prof.P.Mohan Kumar
5	AT8004	New Generation and Hybrid Vehicles	Prof.G.RadhaKrishnan
6	GE8074	Human Rights	Prof.D.Venkatesh
7	AT8711	Engine Performance and Emission Testing Laboratory	Prof.D.Suresh Kumar
8	AT8712	Vehicle Maintenance Laboratory	Prof.P.Selvan
9	-	Library (Monday)	Prof.P.Mohan Kumar
10	-	Association	Prof.P.Selvan
11	-	Library (Wednesday)	Prof.G.RadhaKrishnan
12	-	Technical Seminar	Prof.D.Venkatesh/ Prof.V.R.Palaniappan
13	-	Training and Placement	Prof.P.Selvan/ Prof.S.Yaknesh

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF AUTOMOBILE ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

New Heights Our Tradition

STAFF INDIVIDUAL WORKLOAD
ODD SEMESTER

NAME OF THE STAFF: Mr.D.VENKATESH

SUBJECT NAME WITH CLASS:

1. MANUFACTURING TECHNOLOGY (II YEAR)
2. HUMAN RIGHTS (IV YEAR)
3. ASSOCIATION (II YEAR)
4. TECHNICAL SEMINAR (IV YEAR)

PERIOD	1	2		3	4	5		6	7	8
DAY/ HOUR	9.00-9.45	9.45-10.30		10.45-11.30	11.30-12.15	12.15-1.00		2.00-2.50	2.50-3.40	3.40-4.30
MONDAY						MT				
TUESDAY	HR		TEA BREAK			HR	LUNCH BREAK	ASSO II		
WEDNESDAY					HR					
THURSDAY						HR				
FRIDAY					MT			Technical Seminar		
SATURDAY		HR				MT				
	TOTAL HOURS :12									

IN CHARGE:

1.HOD/AUTOMOBILE DEPARTMENT 2. PLACEMENT IN-CHARGE 4. EDC CO-COORDINATOR. 5. SYMPOSIUM IN-CHARGE

TIME TABLE I/C	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL
	D. Venkatesh		

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF AUTOMOBILE ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD
ODD SEMESTER

NAME OF THE STAFF:Mr.V.R.PALANIAPPAN

SUBJECT NAME WITH CLASS:
1. VEHICLE MAINTENANCE (IV YEAR)
2. VEHICLE DESIGN DATA CHARACTERISTICS (III YEAR)
3. TECHNICAL SEMINAR (IV YEAR)
4. SEMINAR (III YEAR)

PERIOD	1	2		3	4	5		6	7	8
DAY/ HOUR	9.00-9.45	9.45-10.30		10.45-11.30	11.30-12.15	12.15-1.00		2.00-2.50	2.50-3.40	3.40-4.30
MONDAY		VM			VDDC			Seminar		
TUESDAY		VM	TEA BREAK			VDDC	LUNCH BREAK			
WEDNESDAY		VDDC				VM				
THURSDAY					VM					
FRIDAY						VDDC		Technical Seminar		
SATURDAY	VM				VDDC					
	TOTAL HOURS :14									

IN CHARGE:

1..TRANSPORT OFFICER 3. SAE COORDINATOR 4. MINI BIKE IN CHARGE. 5. 2&3 LAB IN-CHARGE

TIME TABLE I/C	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF AUTOMOBILE ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD
ODD SEMESTER

NAME OF THE STAFF:Mr.P.MOHANKUMAR

SUBJECT NAME WITH CLASS:
1. AUTOMOTIVE FUELS AND LUBRICANTS (III YEAR)
2. VEHICLE STYLING AND DESIGN (IV YEAR)
3. AUTOMOTIVE FUELS AND LUBRICANTS LABORATORY (III YEAR)
4. TRAINING AND PLACEMENT (II YEAR)
5. LIBRARY (IV YEAR)
6. MENTOR (II YEAR)

PERIOD	1	2		3	4	5		6	7	8
DAY/ HOUR	9.00-9.45	9.45-10.30		10.45-11.30	11.30-12.15	12.15-1.00		2.00-2.50	2.50-3.40	3.40-4.30
MONDAY	VSD							LIB IV		
TUESDAY		AFL	TEA BREAK		VSD		LUNCH BREAK		AFL Laboratory	
WEDNESDAY		VSD				AFL		MENTOR II		
THURSDAY	VSD			AFL						
FRIDAY		AFL			VSD				AFL Laboratory	
SATURDAY	AFL							Training and Placement		
	TOTAL HOURS:19									

IN CHARGE:

1.EXAM CELL CO-ORDINATOR 2. STUDENTS AFFAIR INCHARGE 3.AEE LAB INCHARGE 4. TUTOR II YEAR 5.EMP LAB INCHARGE

TIME TABLE I/C	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF AUTOMOBILE ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD
ODD SEMESTER

NAME OF THE STAFF:Mr.S.YAKNESH

SUBJECT NAME WITH CLASS:
1. FINITE ELEMENT ANALYSIS (IV YEAR)
2. AIR POLLUTION AND CONTROL ENGINEERING (III YEAR)
3. COMPUTER AIDED MACHINE DRAWING LAB (II YEAR)
4. TRAINING AND PLACEMENT (III & IV YEAR)
5. LIBRARY (III YEAR)

PERIOD	1	2		3	4	5		6	7	8
DAY/ HOUR	9.00-9.45	9.45-10.30		10.45-11.30	11.30-12.15	12.15-1.00		2.00-2.50	2.50-3.40	3.40-4.30
MONDAY				FEA		APCE				
TUESDAY					APCE					
WEDNESDAY			TEA BREAK	APCE			LUNCH BREAK		CAMD Laboratory	
THURSDAY	APCE			FEA					CAMD Laboratory	
FRIDAY	FEA			FEA				LIB III		
SATURDAY		APCE			FEA			Training and Placement		
	TOTAL HOURS:18									

IN CHARGE:

1.AICTE COORDINATOR 2. DEPARTMENT LIBRARY INCHARGE 3. NEWS LETTER EDITOR 4. CADD LAB INCHARGE

TIME TABLE I/C	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF AUTOMOBILE ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD
ODD SEMESTER

NAME OF THE STAFF: Mr.D.SURESH KUMAR

SUBJECT NAME WITH CLASS:

1. AUTOMOTIVE TRANSMISSION (III YEAR)
2. SPARK IGNITION ENGINES (II YEAR)
3. ENGINE PERFORMANCE AND EMISSION TESTING LABORATORY (IV YEAR)
4. TRAINING AND PLACEMENT (III YEAR)
5. LIBRARY (II YEAR)
6. MENTOR (III YEAR)
7. ASSOCIATION (III YEAR)

PERIOD	1	2		3	4	5		6	7	8
DAY/ HOUR	9.00-9.45	9.45-10.30		10.45-11.30	11.30-12.15	12.15-1.00		2.00-2.50	2.50-3.40	3.40-4.30
MONDAY	AT									
TUESDAY			TEA BREAK	SIE			LUNCH BREAK	ASSO III	EPET Laboratory	
WEDNESDAY	AT	SIE						Mentor III	EPET Laboratory	
THURSDAY		AT			SIE					
FRIDAY					AT			LIB II		
SATURDAY				AT				Training and Placement		
	TOTAL HOURS :18									

IN CHARGE:

1. SMS CO-ORDINATOR 2. I.C ENGINES LAB INCHARGE 3. IV CO-ORDINATOR 4. TUTOR (III YEAR) 5. FUELS AND LUBRICANTS LAB INCHARGE

TIME TABLE I/C	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF AUTOMOBILE ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

New Heights Old Traditions

STAFF INDIVIDUAL WORKLOAD
ODD SEMESTER

NAME OF THE STAFF:Mr.P.SELVAN

SUBJECT NAMEWITH CLASS:
1.ENGINE AND VEHICLE MANAGEMENT SYSTEM (IV YEAR)
2.DESIGN OF MACHINE ELEMENTS (III YEAR)
3. VEHICLE MAINTENANCE LABORATORY (IV YEAR)
4. ASSOCIATION (IV YEAR)

PERIOD	1	2		3	4	5		6	7	8
DAY/ HOUR	9.00-9.45	9.45-10.30		10.45-11.30	11.30-12.15	12.15-1.00		2.00-2.50	2.50-3.40	3.40-4.30
MONDAY	DME				EVMS				VM Laboratory	
TUESDAY				DME				ASSO IV		
WEDNESDAY	EVMS		TEA BREAK		DME		LUNCH BREAK			
THURSDAY		EVMS				DME		Mentor IV	VM Laboratory	
FRIDAY	DME					EVMS				
SATURDAY				EVMS				Training and Placement		
	TOTAL HOURS :19									

IN CHARGE:

1.TIME TABLE CO-ORDINATOR 2. AC LAB IN-CHARGE 3. TUTOR (IV YEAR)

TIME TABLE I/C	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF AUTOMOBILE ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

New Heights Old Tradition

STAFF INDIVIDUAL WORKLOAD
ODD SEMESTER

NAME OF THE STAFF: Mr.G.PIRUTHIVIRAM

SUBJECT NAMEWITH CLASS:
1. THERMAL ENGINEERING-II (III YEAR)
2. THERMAL ENGINEERING LABORATORY (III YEAR)
3. MENTOR (III YEAR)

PERIOD	1	2		3	4	5		6	7	8
DAY/ HOUR	9.00-9.45	9.45-10.30		10.45-11.30	11.30-12.15	12.15-1.00		2.00-2.50	2.50-3.40	3.40-4.30
MONDAY	TE-II									
TUESDAY		TE-II						TE LAB		MENTOR III
WEDNESDAY					TE-II					
THURSDAY						TE-II				
FRIDAY				TE-II				TE LAB		
SATURDAY	TE-II									
			TEA BREAK				LUNCH BREAK			
	TOTAL HOURS :11									

IN CHARGE:
1.MENTOR (III YEAR)

TIME TABLE I/C	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF AUTOMOBILE ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD
ODD SEMESTER

NAME OF THE STAFF:Mr.S.ARUNBABU

SUBJECT NAMEWITH CLASS:
1. FLUID MECHANICS AND MACHINERY (II YEAR)
2. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (III YEAR)
3. ASSOCIATION (IV YEAR)

PERIOD	1	2	TEA BREAK	3	4	5	LUNCH BREAK	6	7	8
DAY/ HOUR	9.00-9.45	9.45-10.30		10.45-11.30	11.30-12.15	12.15-1.00		2.00-2.50	2.50-3.40	3.40-4.30
MONDAY				ESIA	FMM					ASSO IV
TUESDAY	ESIA					FMM				
WEDNESDAY				FMM						
THURSDAY	FMM				ESIA					
FRIDAY		FMM				ESIA				
SATURDAY		ESIA			FMM					ASSO IV
	TOTAL HOURS :13									

IN CHARGE:
1.ASSOCIATION (IV YEAR)

TIME TABLE I/C	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
Coimbatore - 641659
Department of Electronics and Communication Engineering
Academic Year 2021-2022
Odd semester

CLASS ROOM	203	ACADEMIC YEAR	2021-2022
SEMESTER/YEAR	V/III	WITH EFFECT FROM	29.11.2021

DAY/Time	9.00 – 09.45 AM	09.45-10.30 AM	10.30-10.45 AM	10.45 – 11.30 AM	11.30 – 12.15 Noon	12.15 – 1.00 PM	1.00 – 2.00	2.00 – 4.30
Monday	EC 8553	EC 8501	BREAK	EC 8552	OMD 551	EC 8551	LUNCH	EC8562
Tuesday	EC 8552	EC 8553		EC 8551	GE 8074	EC 8501		EC 8563
Wednesday	EC 8501	GE 8074		EC 8553	EC 8552	OMD 551		EC 8561
Thursday	EC 8551	EC 8552		OMD 551	EC 8553	GE 8074		EC8562
Friday	OMD 551	EC 8551		GE 8074	EC 8501	EC 8552		EC 8561
Saturday	GE 8074	OMD 551		EC 8501	EC 8551	EC 8553		EC 8563

S.No	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	OMD 551	BASICS OF BIOMEDICAL INSTRUMENTATION	Dr.S.Latha Shanmugavadivu
2	EC 8501	DIGITAL COMMUNICATION	Mrs.T.Arachelvi
3	EC 8552	COMPUTER ARCHITECTURE AND ORGANIZATION	Mr.GANESH
4	EC 8553	DISCRETE TIME SIGNAL PROCESSING	Mr.T.Kannan
5	EC 8551	COMMUNICATION NETWORKS	Mrs.S.Nagammai
6	GE 8074	HUMAN RIGHTS	Mr.R.Poneela Vignesh
7	EC 8561	COMMUNICATION SYSTEM LABORATORY	Mrs.T.Arachelvi
8	EC8562	DIGITAL SIGNAL PROCESSING LABORATORY	Mr.T.Kannan
9	EC 8563	COMMUNICATION NETWORKS LABORATORY	Mrs.S.Nagammai

TIMETABLE INCHARGE	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
Coimbatore - 641659
Department of Electronics and Communication Engineering
Academic Year 2021-2022
Odd semester

CLASS ROOM	305	ACADEMIC YEAR	2021-2022
SEMESTER/YEAR	III/II	WITH EFFECT FROM	29.11.2021

DAY/Time	9.00 – 09.45 AM	09.45-10.30 AM	10.30-10.45 AM	10.45 – 11.30 AM	11.30 – 12.15 Noon	12.15 – 1.00 PM	1.00 – 2.00	2.00 – 4.30
Monday	MA 8352	EC 8391	BREAK	EC 8352	EC 8392	EC 8393	LUNCH	HS 8381
Tuesday	EC 8392	MA 8352		EC 8391	EC 8352	EC 8351		EC 8381
Wednesday	EC 8391	EC 8351		EC 8393	MA 8352	EC 8352		EC 8361
Thursday	EC 8351	EC 8393		EC 8392	EC 8391	EC 8392		EC 8361
Friday	EC 8393	EC 8352		MA 8352	EC 8351	EC 8391		EC 8381
Saturday	EC 8352	EC 8392		EC 8351	EC 8393	MA 8352		Seminar & Association

S.No	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	MA 8352	Linear algebra and partial differential equations	Dr.Sivamani
2	EC 8393	Fundamentals of data structures in c	Mrs.Shenbagavalli
3	EC 8351	Electronic circuits i	Mr.K.Ramkarthick kumar
4	EC 8352	Signals and systems	Mr.T.Kannan
5	EC 8392	Digital electronics	Mrs.T.Arachelvi
6	EC 8391	Control system engineering	Mrs.Manjula
7	EC 8381	Fundamentals of data structures in c Laboratory	Mrs.Shenbagavalli
8	EC 8361	Analog and Digital Circuits Laboratory	Mr.K.Ramkarthick kumar
9	HS 8381	Interpersonal skill/listening and speaking	Mr.Raj Thilak

TIMETABLE INCHARGE	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
Coimbatore - 641659
Department of Electronics and Communication Engineering
Academic Year 2021-2022
Odd semester

CLASS ROOM	204	ACADEMIC YEAR	2021-2022
SEMESTER/YEAR	VII/IV	WITH EFFECT FROM	29.11.2021

DAY/Time	9.00 – 09.45 AM	09.45-10.30 AM	10.30-10.45 AM	10.45 – 11.30 AM	11.30 – 12.15 Noon	12.15 – 1.00 PM	1.00 – 2.00	2.00 – 4.30
Monday	GE 8071	EC 8701	BREAK	EC 8702	EC 8751	OCE751	LUNCH	EC 8711
Tuesday	EC 8702	EC 8751		GE 8071	EC 8791	EC 8701		EC 8761
Wednesday	OCE751	GE 8071		EC 8791	EC 8702	EC 8791		EC 8711
Thursday	EC 8701	OCE751		EC 8751	GE 8071	EC 8702		EC 8761
Friday	EC 8751	EC 8791		EC 8701	OCE751	GE 8071		Project
Saturday	EC 8791	EC 8702		OCE751	EC 8701	EC 8751		Seminar & Association

S.No	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	EC 8701	Antenna and Microwave Engineering	Dr.S.Latha Shanmugavadivu
2	EC 8751	Optical Communication	Mr.R.Poneela Vignesh
3	EC 8791	Embedded System	Mr.K.Ramkarthick Kumar
4	OCE751	Environmental and Social Impact Assessment	Mr.T.Kannan
5	EC 8702	Ad Hoc Wireless Sensor Network	Mrs.S.Nagammai
6	GE 8071	Disaster Management	Mr.Devasugan
7	EC 8761	Advanced Communication Lab	Dr.S.Latha Shanmugavadivu
8	EC 8711	Embedded System Lab	Mr.K.Ramkarthick Kumar

TIMETABLE INCHARGE	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF ECE
ACADEMIC YEAR 2021-2022 (ODD SEMESTER)
STAFF INDIVIDUAL WORKLOAD

STAFF NAME : Mr.Lokesh
SUBJECT NAMES WITH CLASS : EC8702 Ad Hoc Wireless Sensor Network
EC 8711 Embedded System Lab

DAY/ HOUR	1 9:00-9:45	2 9:45-10:30		3 10:45-11:30	4 11:30-12:15	5 12:15-1:00		6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON			BREAK	EC8702			LUNCH		EC 8711	
TUE	EC8702									
WED					EC8702				EC 8711	
THU						EC8702				
FRI										
SAT		EC8702								

Total Hours:5+6=11

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF ECE
ACADEMIC YEAR 2021-2022 (ODD SEMESTER)
STAFF INDIVIDUAL WORKLOAD

STAFF NAME : Mr.V.Thangavel
SUBJECT NAMES WITH CLASS : GE 8074 HUMAN RIGHTS
EC 8361 Analog and Digital Circuits Laboratory

DAY/ HOUR	1 9:00-9:45	2 9:45-10:30		3 10:45-11:30	4 11:30-12:15	5 12:15-1:00		6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON			BREAK				LUNCH			
TUE					GE 8074					
WED		GE 8074							EC 8361	
THU						GE 8074			EC 8361	
FRI				GE 8074						
SAT	GE 8074									

Total Hours:5+6=11

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF ECE
ACADEMIC YEAR 2021-2022 (ODD SEMESTER)
STAFF INDIVIDUAL WORKLOAD

STAFF NAME : Mrs.T.Arachelvi
SUBJECT NAMES WITH CLASS : EC8392 Digital Electronics (II ECE)
CS 8351 Digital Principles and system Design (II CSE)

DAY/ HOUR	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11:30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON					EC 8392	CS 8351				
TUE	EC 8392			CS 8351						
WED		CS 8351								
THU	CS 8351			EC 8392		EC 8392				
FRI		CS 8351								
SAT		EC 8392				CS 8351				

Total Hours: 11

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL
T. Arachelvi		L Ponni	

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF ECE
ACADEMIC YEAR 2021-2022 (ODD SEMESTER)
STAFF INDIVIDUAL WORKLOAD

STAFF NAME : Mr.T.Kannan
SUBJECT NAMES WITH CLASS: OCE 751 Environmental and Social Impact Assessment
EC8352 Signals and Systems (II ECE)

DAY/ HOUR	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11:30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON				EC8352		OCE 751				
TUE					EC8352					
WED	OCE 751					EC8352				
THU		OCE 751								
FRI		EC8352			OCE 751					
SAT	EC8352			OCE 751						

Total Hours:10

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL
T. Arachelvi		L Ponni	

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF ECE
ACADEMIC YEAR 2021-2022 (ODD SEMESTER)
STAFF INDIVIDUAL WORKLOAD

STAFF NAME : Dr.Sivakumar

DAY/ HOUR	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11:30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON				IV CSE						
TUE						IV CSE				
WED					IV CSE					
THU										
FRI	IV CSE									
SAT										

Total Hours: =4

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF ECE
ACADEMIC YEAR 2021-2022 (ODD SEMESTER)
STAFF INDIVIDUAL WORKLOAD

STAFF NAME : Mrs.Gokila
SUBJECT NAMES WITH CLASS :

DAY/ HOUR	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11:30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON				III ICE						
TUE		III ICE				II ICE		III EEE CONT. & INSTRU. LAB		
WED		II ICE				III ICE				
THU				II ICE	III ICE					
FRI	III ICE							III EEE CONT. & INSTRU. LAB		
SAT	II ICE									

Total Hours:9+6=15

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF ECE
ACADEMIC YEAR 2021-2022 (ODD SEMESTER)
STAFF INDIVIDUAL WORKLOAD

STAFF NAME : Ms.V.Kanimozhi
SUBJECT NAMES WITH CLASS : EC6702 Optical Communication and Networks (IV ECE)
EC 8761 Advanced Communication Lab (IV ECE)

DAY/ HOUR	1 9:00-9:45	2 9:45-10:30		3 10:45-11:30	4 11:30-12:15	5 12:15-1:00		6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON			BREAK		EC6702		LUNCH			
TUE		EC6702						EC 8761		
WED										
THU				EC6702				EC 8761		
FRI	EC6702									
SAT						EC6702				

Total Hours:5+6=11

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF ECE
ACADEMIC YEAR 2021-2022 (ODD SEMESTER)
STAFF INDIVIDUAL WORKLOAD

STAFF NAME : Ms.Darthy Rabeka
SUBJECT NAMES WITH CLASS : EC8395 Communication Engineering (II CSE)
CS 8382 Digital Systems Laboratory

DAY/ HOUR	1 9:00-9:45	2 9:45-10:30		3 10:45-11:30	4 11:30-12:15	5 12:15-1:00		6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON			BREAK		EC8395		LUNCH			
TUE		EC8395								
WED						EC8395		CS 8382		
THU										
FRI	EC8395							CS 8382		
SAT				EC8395						

Total Hours:5+6=11

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF ECE
ACADEMIC YEAR 2021-2022 (ODD SEMESTER)
STAFF INDIVIDUAL WORKLOAD

STAFF NAME : Mrs G.Divya Mohanapriya
SUBJECT NAMES WITH CLASS : EC8501 Digital Communication(III ECE)
EC 8561 Communication System Lab (III ECE)

DAY/ HOUR	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11:30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON		EC 8501								
TUE						EC 8501				
WED	EC 8501							EC 8561		
THU										
FRI					EC 8501			EC 8561		
SAT				EC 8501						

Total Hours:5+6=11

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL
T. Divya			

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF ECE
ACADEMIC YEAR 2021-2022 (ODD SEMESTER)
STAFF INDIVIDUAL WORKLOAD

STAFF NAME : Ms.Priyadharshini

DAY/ HOUR	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11:30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON		IV ICE				III EEE		II EEE & ICE LAB		
TUE				III EEE						
WED		III EEE			IV ICE					
THU				IV ICE						
FRI	IV ICE			III EEE				II EEE & ICE LAB		
SAT	III EEE					IV ICE				

Total Hours:10+6=16

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL
T. Priya			

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF ECE
ACADEMIC YEAR 2021-2022 (ODD SEMESTER)
STAFF INDIVIDUAL WORKLOAD

STAFF NAME : Mr.K.Ramkarthickkumar
SUBJECT NAMES WITH CLASS : EC8351 Electronics Circuits I (II ECE)
EC6703 Embedded and Real Time System (IV ECE)

DAY/ HOUR	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11:30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON										
TUE					EC6703	EC8351				
WED		EC8351		EC6703		EC6703				
THU	EC8351									
FRI		EC6703			EC8351					
SAT	EC6703			EC8351						

Total Hours:10

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF ECE
ACADEMIC YEAR 2021-2022 (ODD SEMESTER)
STAFF INDIVIDUAL WORKLOAD

STAFF NAME : Mr.R.Thiruvengadam
SUBJECT NAMES WITH CLASS : EC8553 Discrete-Time Signal Processing(III ECE)
EC8562 Digital Signal Processing Laboratory(III ECE)

DAY/ HOUR	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11:30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON	EC 8553							EC8562		
TUE		EC 8553								
WED				EC 8553						
THU					EC 8553			EC8562		
FRI										
SAT						EC 8553				

Total Hours:5+6=11

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING

KARUMATHAMPATTI, COIMBATORE -641 659

DEPARTMENT OF CIVIL ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

ODD SEMESTER

DEPARTMENT	CIVIL ENGINEERING	ACADEMIC YEAR	2021-2022
CLASS ROOM	A 103	YEAR	SECOND YEAR
SEMESTER	III	WITH EFFECT FROM	15.11.2021

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30		3 10:45-11.30	4 11:30-12:15	5 12:15-1:00		6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON	TPDE	EG	BREAK	SUR	FM	SOM-I	LUNCH	Inter personals skills/listening and speaking		
TUE	SOM-I	TPDE		EG	SUR	CM		Construction materials lab		
WED	FM	SOM-I		FM	TPDE	SUR		Surveying lab		
THUR	SUR	FM		CM	EG	TPDE		Construction materials lab		
FRI	CM	SUR		TPDE	SOM-I	FM		Surveying lab		
SAT	EG	TPDE		SOM-I	CM	EG		LIB	T&P	ASSO

S.NO.	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	MA8353	Transforms and Partial Differential Equations	Prof C.RubySharmila
2	CE8302	Fluid Mechanics	Prof A.S Rajasree
3	CE8301	Strength of Materials I	Prof S.Gopalakrishnan
4	CE8351	Surveying	Prof G.A.SherlinSibitha
5	CE8391	Construction Materials	Prof R.Keerthana
6	CE8392	Engineering Geology	Dr. V.Kavimani
7	CE8311	Construction materials lab	Prof A.S Rajasree
8	CE8361	Surveying lab	Prof G.A.SherlinSibitha
9	HS8381	Inter personals skills/listening and speaking	Prof Mr Raj Thilak

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL
For,			

TAMILNADU COLLEGE OF ENGINEERING

KARUMATHAMPATTI, COIMBATORE -641 659

DEPARTMENT OF CIVIL ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

ODD SEMESTER

DEPARTMENT	CIVIL ENGINEERING	ACADEMIC YEAR	2021-2022
CLASS ROOM	A 104	YEAR	THIRD YEAR
SEMESTER	V	WITH EFFECT FROM	15.11.2021

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON	DRCCE	SA I		WSE	DM	E&A		Soil mechanics lab		
TUE	SA I	FE		DRCCE	E&A	WSE		Water and waste water analysis lab		
WED	FE	WSE		DM	DRCCE	SA I		Survey Camp		
THUR	E&A	DM		E&A	SA I	FE		Soil mechanics lab		
FRI	WSE	E&A		FE	DRCCE	DM		Water and waste water analysis lab		
SAT	DM	DRCCE		SA I	WSE	FE		SEMI	MENT	T & P

S.NO.	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	CE8501	Design of Reinforced Cement Concrete Elements	Dr. M.Seethapathi
2	CE8502	Structural Analysis I	Prof. L.Periyasamy
3	EN8491	Water Supply Engineering	Prof. A.S Rajasree
4	CE8591	Foundation Engineering	Prof.S.D.Thulasirajan
5	GE8071	Disaster Management	Prof. G.A.SherlinSibitha
6	OAI551	Environment and agriculture	Dr.V.Kavimani
7	CE8511	Soil mechanics lab	Dr.V.Kavimani
8	CE8512	Water and waste water analysis lab	Prof.R.Keerthana
9	CE8513	Survey Camp	Prof. S.Gopalakrishnan

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL
For CEOs		CEOs	

TAMILNADU COLLEGE OF ENGINEERING

KARUMATHAMPATTI, COIMBATORE -641 659

DEPARTMENT OF CIVIL ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

ODD SEMESTER

DEPARTMENT	CIVIL ENGINEERING	ACADEMIC YEAR	2021-2022
CLASS ROOM	A 105	YEAR	FINAL YEAR
SEMESTER	VII	WITH EFFECT FROM	15.11.2021

HOUR/DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON	ECV	MSWM		SD&D	RAHE	GBD		PROJECT WORK		
TUE	MSWM	GBD		MSWM	SD&D	ECV		PROJECT WORK		
WED	RAHE	SD&D		GBD	ECV	RAHE		INDUSTRIAL TRAINING		
THUR	SD&D	RAHE		ECV	GBD	MSWM		INDUSTRIAL TRAINING		
FRI	GBD	ECV		RAHE	MSWM	SD&D		PROGRESS REPORT SUBMISSION		
SAT	IT			PROJECT WORK				SEMI	MENT	T & P

S.NO.	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	CE8701	Estimation, Costing and Valuation Engineering	Prof. L.Periyasamy
2	CE8702	Railways, Airport and Harbour Engineering	Dr. S.D.Thulasirajan
3	CE8703	Structural Design and Drawing	Prof R.Keerthana
4	EN8591	Municipal Solid Waste Management	Prof. K,Balaji
5	OEN751	Green Building Design	Dr. M.Seethapathi
6	CE8711	Creative and Innovative project	Dr. M.Seethapathi
7	CE8712	Industrial Training	Prof. L.Periyasamy

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL
For,			

TAMILNADU COLLEGE OF ENGINEERING COIMBATORE – 641 659

DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR 2021-2022 (ODD SEMESTER)

STAFF OVERALL WORKLOAD

SNO	STAFF NAME	CURRICULUM WORKLOAD			ADDITIONAL WORKLOAD					TOTAL
		THEORY	LAB M	LAB A	T & P	ASSO	LIB	MT	SM/PR	
1	Dr.M.Seethapathi	5+5	9							19
2	Dr.V.Kavimani	5+5	6		1	1			2	20
3	Prof.L.Periyasamy	5+5	8		1				1	20
4	Prof.A.S Rajasree	5+5	6			2	1	1		20
5	Prof.G.A.Sherlin Sibitha	5+5	6					1	1	22
6	Prof.R.Keerthana	4+5+5	6				1	1	1	24
7	Prof.S.Gopalakrishnan	5+6			1		1			13
8	Prof.S.D.Thulasirajan	5+5	4							14
9	Prof.K.Balaji	5+6+6								17

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL
For CRelvi		CRelvi	

TAMILNADU COLLEGE OF ENGINEERING

COIMBATORE -641 659

DEPARTMENT OF CIVIL ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME :.Dr.V.Kavimani

SUBJECT NAMES WITH CLASS: Engineering Geology (II YR), Environment and agriculture (III YR)& Soil mechanics lab (III YR), Seminar(ME II YR)

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON		EG				E&A		SOIL MECHANICS LAB		
TUE				EG	E&A					
WED		SEMI		SEMI						
THUR	E&A			E&A	EG			SOIL MECHANICS LAB		
FRI		E&A		SEMI						
SAT	EG					EG		SEMI		

TOTAL HOURS :5+5+6+2+1+1=20

ADDITIONAL WORKLOADS:

1.Final Year Tutor & Mentor

2. Survey Lab i/c

3.YRC coordinator

4.PMKVY Course co ordinator

5.Consultancy Work

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF CIVIL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME : Prof.A.S RAJASREE

SUBJECT NAMES WITH CLASS : Fluid Mechanics (II YR), Construction materials lab (II -YR), Water Supply Engineering (III YR)

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON				WSE	FM					
TUE						WSE		CM LAB		
WED	FM	WSE		FM						
THUR		FM						CM LAB		
FRI	WSE					FM				
SAT					WSE					

TOTAL HOURS :5+5+6+2+1+1=20

ADDITIONAL WORKLOADS:

1. Hydraulic Engg Lab i/c
2. EDC i/c
3. News Letter i/c
4. INTERNSHIP/ IMPLANT TRAINING
5. III YR TUTOR

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL
Prof. L Rajasree		L Rajasree	

TAMILNADU COLLEGE OF ENGINEERING

COIMBATORE -641 659

DEPARTMENT OF CIVIL ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME : Prof.R.KEERTHANA

SUBJECT NAMES WITH CLASS: Construction Materials (II YR) , Structural Design and Drawing (IV YR), Design of Bridges (M.E - II YR) & Water and waste water analysis lab (III YR)

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON	DOB			SDD						
TUE	DOB				SDD	CM		WWWA LAB		
WED		SDD				DOB				
THUR	SDD	DOB		CM						
FRI	CM					SDD		WWWA LAB		
SAT		DOB			CM					

TOTAL HOURS :4+5+5+6+1+1=22

ADDITIONAL WORKLOADS:

1. Tutor& Mentor (IV yr)
2. Advance Structural Engineering Lab i/c
3. Exam Cell In-charge
4. Website coordinator
5. ME Second Year Tutor

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL
For,			

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF CIVIL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME :Mr.S.GOPALAKRISHNAN

SUBJECT NAMES WITH CLASS: Strength of Materials I (II YR), Survey Camp (III YR), Design of Steel Concrete Composite Structures (ME II YR)

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON		DOSCCS				SOM I				
TUE	SOM I			DOSCCS						
WED	DOSCCS	SOM I			DOSCCS					
THUR										
FRI		DOSCCS			SOM I					
SAT	DOSCCS			SOM I						

TOTAL HOURS : 5+6+1+1=13

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF CIVIL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME : Prof.A.S RAJASREE

SUBJECT NAMES WITH CLASS : Fluid Mechanics (II YR), Construction materials lab (II -YR), Water Supply Engineering (III YR)

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON				WSE	FM					
TUE						WSE		CM LAB		
WED	FM	WSE		FM						
THUR		FM						CM LAB		
FRI	WSE					FM				
SAT					WSE					

TOTAL HOURS :5+5+6+2+1+1=20

ADDITIONAL WORKLOADS:

1. Hydraulic Engg Lab i/c
2. EDC i/c
3. News Letter i/c
4. INTERNSHIP/ IMPLANT TRAINING
5. III YR TUTOR

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF CIVIL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME :Mrs.C.RUBYSHARMILA

SUBJECT NAMES WITH CLASS: Transforms and Partial Differential Equations (II YR)

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON	TPDE									
TUE		TPDE								
WED					TPDE					
THUR						TPDE				
FRI				TPDE						
SAT		TPDE								

TOTAL HOURS : 6

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF CIVIL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME :Mr.K.BALAJI

SUBJECT NAMES WITH CLASS: Municipal Solid Waste Management (IVYR), Earthquake Analysis and Design of Structures (ME II YR), Practical Training II (ME II YR)

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON		MSWM		EADS				PRACTICAL TRAINING		
TUE	MSWM	EADS		MSWM		EADS				
WED										
THUR	EADS					MSWM				
FRI	EADS				MSWM	EADS		PRACTICAL TRAINING		
SAT										

TOTAL HOURS : 5+6+6=17

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL
For, LBalaji		LBalaji	

TAMIL NADU COLLEGE OF ENGINEERING,

COIMBATORE-641 659

DEPARTMENT OF CIVIL ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME : Mr.S.D.THIYAGARAJAN

SUBJECT NAMES WITH CLASS: Foundation Engineering (III YR), Railways, Airport and Harbour Engineering(IV YR) SEMINAR (ME II YR)

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50-3:40	8 3:40-4:30
MON					RAHI					
TUE		FT								
WED	FT	RAHI		SEMI		RAHI				
THUR		RAHI		SEMI		FT				
FRI				FT	RAHI					
SAT					SEMI	FT				

TOTAL HOURS 5+5+4=14

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING

COIMBATORE -641 659

DEPARTMENT OF CIVIL ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME :.Dr.M.Seethapathi

SUBJECT NAMES WITH CLASS : Design of Reinforced Cement Concrete Eiements(III -YR), Green Building Design (IV YR) & Creative and Innovative project (IV YR),PROJECT WORK PHASE-I(ME II YR)

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON	DRCCE					GBD		PROJECT WORK		
TUE		GBD		DRCCE				PROJECT WORK		
WED				GBD	DRCCE					
THUR					GBD					
FRI	GBD				DRCCE					
SAT		DRCCE		PROJECT WORK						

TOTAL HOURS :5+5+9=19

ADDITIONAL WORKLOADS:

1.Head of the Department

2.Project co-ordinator

3. PMKVY Course co ordinator.

4. Value Added Courses-Co ordinator

5.Consultancy Work

6. PG Co ordinator

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING

KARUMATHAMPATTI, COIMBATORE -641 659

DEPARTMENT OF CIVIL ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

ODD SEMESTER

DEPARTMENT	M.E. STRUCTURAL	ACADEMIC YEAR	2021-2022
CLASS ROOM	A 105	YEAR	II YEAR
SEMESTER	III	WITH EFFECT FROM	18.08.2021

HOUR/DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON	DOB	DOSCCS		EADS	LIB	ASSO		PRACTICAL TRAINING		
TUE	DOB	EADS		DOSCCS	SEMIN	EADS		P.W-PHASE-I		
WED	DOSCCS	SEMIN		SEMIN	DOSCCS	DOB		P.W-PHASE-I		
THUR	EADS	DOB		SEMIN	DOB	LIB		SEMINAR		
FRI	EADS	DOSCCS		SEMIN	LIB	EADS		PRACTICAL TRAINING		
SAT	DOSCCS	DOB		SEMINAR		LIB		SEMI	MENT	T & P

S.NO.	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	ST5301	Earthquake Analysis and Design of Structures	Prof.K.Balaji
2	ST5014	Design of Steel Concrete Composite Structures	Prof.S.Gopalakrishnan
3	ST5015	Design of Bridges	Prof R.Keerthana
4	ST5311	Practical Training II	Prof. K.Balaji
5	ST5312	Seminar	Prof.S.D.Thulasirajan/ Dr.V.Kavimani
6	ST5313	Project work (Phase I)	Dr. M.Seethapathi/ Prof.L.Periyasamy
7			

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE -641 659
DEPARTMENT OF CIVIL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME :Mr.S.D.THULASIRAJAN

SUBJECT NAMES WITH CLASS: Foundation Engineering (III YR), Railways, Airport and Harbour Engineering(IV YR).SEMINAR (ME II YR)

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON					RAHE					
TUE		FE								
WED	FE	RAHE		SEMI		RAHE				
THUR		RAHE		SEMI		FE				
FRI				FE	RAHE					
SAT				SEMI		FE				

TOTAL HOURS : 5+5+4=14

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL
For,			

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE-641 659
DEPARTMENT OF CIVIL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022

STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME :Mr.S.D.THULASIRAJAN

SUBJECT NAMES WITH CLASS: Foundation Engineering (III YR), Railways, Airport and Harbour Engineering(IV YR),SEMINAR (ME II YR)

HOUR/ DAY	1 9:00-9:45	2 9:45-10:30	BREAK	3 10:45-11.30	4 11:30-12:15	5 12:15-1:00	LUNCH	6 2:00-2:50	7 2:50- 3:40	8 3:40-4:30
MON					RAHE					
TUE		FE								
WED	FE	RAHE		SEMI		RAHE				
THUR		RAHE		SEMI		FE				
FRI				FE	RAHE					
SAT				SEMI		FE				

TOTAL HOURS : 5+5+4=14

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL
For			

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
ODD SEMESTER

DEPARTMENT	ICE	**ACADEMIC YEAR**	**2021 – 2022**
CLASS ROOM	IC203	**YEAR, BRANCH, SECTION**	II ICE
SEMESTER	III	**WITH EFFECT FROM**	18.08.2021

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MON	TPDE	OOPS		EMS	EDC	DLC		OOP LAB		
TUE	OOPS	TPDE		DLC	EMS	TE		M&T LAB		
WED	EMS	TE		OOPS	TPDE	EDC		T&P	MENT	LIB
THUR	DLC	EDC		TE	OOPS	TPDE		ASSOC		
FRI	EDC	DLC		TPDE	EMS	OOPS		M&T LAB		
SAT	TE	TPDE		EDC	DLC	EMS		OOP LAB		

S.NO.	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	MA8353	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS (TPDE)	Mrs. C.RUBY SHARMILA
2	EC8353	ELECTRON DEVICES AND CIRCUITS (EDC)	Ms.S. PRIYADHARSHINI
3	EE8351	DIGITAL LOGIC CIRCUITS (DLC)	Ms. M.V.RAMYA
4	EI8351	ELECTRICAL MEASUREMENTS (EMS)	Mr. D.YUVARAJ
5	EI8352	TRANSDUCERS ENGINEERING (TE)	Mrs. R.GOKILA
6	CS8392	OBJECT ORIENTED PROGRAMMING (OOP)	Mr. V.ARUNKUMAR
7	EI8361	MEASUREMENTS AND TRANSDUCERS LABORATORY (M&T LAB)	Mr.N.RAMESHKUMAR
8	CS8383	OBJECT ORIENTED PROGRAMMING LABORATORY (OOP LAB)	Mr. V.ARUNKUMAR
9	ASSOC	ASSOCIATION	Mr.N.RAMESHKUMAR
10	T&P	TRAINING AND PLACEMENT	Mr.N.RAMESHKUMAR
11	LIB	LIBRARY	Mrs. C.SUMITHRA
12	MENT	MENTORING HOUR	Mrs. C.SUMITHRA
13	TUTOR		Mrs. R.GOKILA

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
ODD SEMESTER

DEPARTMENT	ICE	**ACADEMIC YEAR**	**2021 – 2022**
CLASS ROOM	IC202	**YEAR, BRANCH, SECTION**	III ICE
SEMESTER	V	**WITH EFFECT FROM**	18.08.2021

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30		3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00		6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MON	UOC	PC	TEA BREAK	AI	II – 2	APCE	LUNCH	II LAB		
TUE	PC	AI		MP&MC	APCE	II - 2		MP&MC LAB		
WED	MP&MC	II - 2		APCE	UOC	AI		II LAB		
THUR	APCE	MP&MC		PC	AI	UOC		MP&MC LAB		
FRI	AI	MP&MC		II - 2	PC	UOC		LIB	T&P	MENT
SAT	II - 2	APCE		UOC	MP&MC	PC		ASSOC		

S.NO.	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	EE8551	MICROPROCESSOR & MICROCONTROLLER (MP&MC)	Mr.S.VIVEK
2	EI8551	ANALYTICAL INSTRUMENTS (AI)	Mrs.R.GOKILA
3	EI8552	INDUSTRIAL INSTRUMENTATION – 2 (II-2)	Mrs.A.MANJULA
4	EI8553	PROCESS CONTROL (PC)	Dr.G.SARAVANAKUMAR
5	EI8093	UNIT OPERATION & CONTROL (UOC)	Mrs.G.SATHYA
6	OMF551	AIR POLLUTION & CONTROLENGINEERING (APCE)	Mr.S.YAKNESH
7	EE8681	MICROPROCESSOR & MICROCONTROLLER LABORATORY (MP&MC LAB)	Mr.S.VIVEK
8	EI8561	INDUSTRIAL INSTRUMENTATION LABORATORY (II LAB)	Mrs.S.SRI SARANYA
9	ASSOC	ASSOCIATION	Mrs. C.SUMITHRA / Mrs.S.SRI SARANYA
10	T&P	TRAINING AND PLACEMENT	Mrs.G.SATHYA
11	LIB	LIBRARY	Mrs.S.SRI SARANYA
12	MENT	MENTORING HOUR	Mrs.A.MANJULA
13	TUTOR		Mrs.A.MANJULA

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
ODD SEMESTER

DEPARTMENT	ICE	**ACADEMIC YEAR**	**2021 – 2022**
CLASS ROOM	IC201	**YEAR, BRANCH, SECTION**	IV ICE
SEMESTER	VII	**WITH EFFECT FROM**	18.08.2021

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MON	DM	DIP		AMI	IDN	EI		IA LAB		
TUE	EI	AMI		DM	IPCI	IDN		ISD LAB		
WED	AMI	DM		EI	DIP	IPCI		IA LAB		
THUR	IPCI	IDN		DIP	DM	AMI		ISD LAB		
FRI	DIP	IPCI		IDN	EI	DM		T&P	LIB	MENT
SAT	IDN	AMI		IPCI	EI	DIP		ASSOC		

S.NO.	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	EI8751	INDUSTRIAL DATA NETWORKS	Mr. D.YUVARAJ
2	EI8091	INSTRUMENTATION IN PETROCHEMICAL INDUSTRIES	Dr. G.SARAVANAKUMAR
3	EC8093	DIGITAL IMAGE PROCESSING	Mrs.S.PRIYADHARSHINI
4	EI8072	ADVANCED INSTRUMENTATION SYSTEMS	Mr. P.SAKTHIVEL
5	EI8692	ELECTRONIC INSTRUMENTATION	Mrs. G.SATHYA
6	GE8071	DISASTER MANAGEMENT	Mr.S.M. DEVASUGAN
7	EI8761	INDUSTRIAL AUTOMATION LABORATORY	Mr. A.MYILSAMY
8	EI8762	INSTRUMENTATION SYSTEM DESIGN LABORATORY	Mrs. C.SUMITHRA
9	T&P	TRAINING AND PLACEMENT	Mr. A.MYILSAMY
10	LIB	LIBRARY	Mrs. S.SRISARANYA
11	MENT	MENTORING HOUR	Mr. D.YUVARAJ
12	ASSOC	ASSOCIATION	Mr. A.MYILSAMY
13	TUTOR		Mr. D.YUVARAJ

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

NAME OF THE STAFF : Mrs. R.GOKILA

SUBJECT NAME WITH CLASS :

1) TRANSDUCER ENGINEERING – II ICE
2) ANALYTICAL INSTRUMENTS – III ICE
3) CONTROL & INSTRUMENTATION LAB – III EEE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY				AI (III ICE)						
TUESDAY		AI (III ICE)				TE (II ICE)		C&I LAB (III EEE)		
WEDNESDAY		TE (II ICE)				AI (III ICE)				
THURSDAY				TE (II ICE)	AI (III ICE)					
FRIDAY	AI (III ICE)							C&I LAB (III EEE)		
SATURDAY	TE (II ICE)									

TOTAL HOURS =4+5+6 =15

1. ADVANCED CONTROL SYSTEM LAB IN CHARGE.
2. DERATMENT TIME TABLE IN CHARGE / UNIVERSITY PRACTICAL EXAM TIME TABLE IN CHARGE.
3. ALUMNI IN CHARGE
4. HOD MEETING MINUTES REPORT
5. II-YEAR TUTOR AND ALL OTHER ACADEMIC DETAILS OF THE STUDENTS.

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

NAME OF THE STAFF : Mr. D.YUVARAJ

SUBJECT NAME WITH CLASS :

1) INDUSTRIAL DATA NETWORKS – IV ICE
2) ELECTRICAL MEASUREMENTS – II ICE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY				EMS (II ICE)	IDN (IV ICE)					
TUESDAY					EMS (II ICE)	IDN (IV ICE)				
WEDNESDAY	EMS (II ICE)									
THURSDAY		IDN (IV ICE)								
FRIDAY				IDN (IV ICE)	EMS (II ICE)					MENT (IV ICE)
SATURDAY	IDN (IV ICE)					EMS (II ICE)				

TOTAL HOURS =5+5=1=11

1. PROCESS CONTROL LAB AND TRANSDUCER LAB IN CHARGE.
2. ASSOCIATION CO-ORDINATOR /RESEARCH COORDINATOR
3. DISCIPLINE COORDINATOR/ DEPARTMENT NEWS LETTER IN CHARGE.
4. ASSISTING HOD IN ALL DEPARTMENT ACTIVITIES
5. IV-YEAR TUTOR AND ALL OTHER ACADEMIC DETAILS OF THE STUDENTS

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

New Heights Old Tradition

NAME OF THE STAFF : Mrs. A.MANJULA

SUBJECT NAME WITH CLASS :

1) CONTROL SYSTEMS ENGINEERING – II ECE
2) INDUSTRIAL INSTRUMENTATION - 2 – III ICE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY				CS (II ECE)	II – 2 (III ICE)					
TUESDAY						II – 2 (III ICE)				
WEDNESDAY	CS (II ECE)	II – 2 (III ICE)								
THURSDAY						CS (II ECE)				
FRIDAY				II – 2 (III ICE)	CS (II ECE)					MENT (III ICE)
SATURDAY	II – 2 (III ICE)	CS (II ECE)								

TOTAL HOURS =5+5 +1=11

1. CONTROL SYSTEM LAB IN CHARGE.
2. AICTE AND ANNA UNIVERSITY AUDIT REPORT IN CHARGE & ANNA UNIVERSITY OTHER WORK. / STUDENTS DETAILS.
3. EXAMCELL COORDINATOR
4. III-YEAR TUTOR AND ALL OTHER ACADEMIC DETAILS OF THE STUDENTS

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

NAME OF THE STAFF : Mrs. G.SATHYA

SUBJECT NAME WITH CLASS :

1) UNIT OPERATION & CONTROL – III ICE
2) ELECTRONIC INSTRUMENTATION – IV ICE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY	UOC (III ICE)					EI (IV ICE)				
TUESDAY	EI (IV ICE)									
WEDNESDAY				EI (IV ICE)	UOC (III ICE)					
THURSDAY						UOC (III ICE)				
FRIDAY					EI (IV ICE)	UOC (III ICE)			T&P (III ICE)	
SATURDAY				UOC (III ICE)	EI (IV ICE)					

TOTAL HOURS =5+5 +1=11

1. DESIGN PROJECT LAB IN CHARGE
2. INDUSTRIAL VISIT COORDINATOR
3. DEPARTMENT LIBRARY INCHARGE
4. DEPARTMEN STATIONARY INCHARGE

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

NAME OF THE STAFF : Mr. N.RAMESH KUMAR

SUBJECT NAME WITH CLASS :

1) MEASUREMENTS & TRANSDUCERS LABORATORY - II ICE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY										
TUESDAY								M&T LAB (II ICE)		
WEDNESDAY								T&P (II ICE)		
THURSDAY								ASSOC (II ICE)		
FRIDAY								M&T LAB (II ICE)		
SATURDAY										

TOTAL HOURS =6+4=10

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

NAME OF THE STAFF : Mrs. S.SRISARANYA

SUBJECT NAME WITH CLASS :

1) INDUSTRIAL INSTRUMENTATION LABORATORY - III ICE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY								II LAB (III ICE)		
TUESDAY										
WEDNESDAY								II LAB (III ICE)		
THURSDAY										
FRIDAY								LIB (III ICE)	LIB (IV ICE)	
SATURDAY								ASSOC (III ICE)		

TOTAL HOURS =6+4=10

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

NAME OF THE STAFF : Mrs. C.SUMITHRA

SUBJECT NAME WITH CLASS :

1) INSTRUMENTATION SYSTEM DESIGN LABORATORY - IV ICE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY										
TUESDAY								ISD LAB (IV ICE)		
WEDNESDAY									MENT (II ICE)	LIB (II ICE)
THURSDAY								ISD LAB (IV ICE)		
FRIDAY										
SATURDAY										ASSOC (III ICE)

TOTAL HOURS =6+3=9

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

NAME OF THE STAFF : Mr. A.MAYILSAMY

SUBJECT NAME WITH CLASS :

1) INDUSTRIAL AUTOMATION LABORATORY - IV ICE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY								IA LAB (IV ICE)		
TUESDAY										
WEDNESDAY								IA LAB (IV ICE)		
THURSDAY										
FRIDAY								T&P (IV ICE)		
SATURDAY								ASSOC (IV ICE)		

TOTAL HOURS =6+4=10

TIME TABLE I/C	HOD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING,
COIMBATORE-641654
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING.
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
ODD SEMESTER

DEPARTMENT	CSE	ACADEMIC YEAR	2021-2022
CLASS ROOM	A-107	YEAR,BRANCH&SECTION	II CSE
SEMESTER	III	WITH EFFECT FROM	18.08.2021

HOUR / DAY	1 9.00-9.45	2 9.45-10.35	BREAK	3 10.50-11.40	4 11.40-12.30	5 12.30-1.20	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON	DS	OOPS		DM	CE	DPSD		....OOPS LAB....		
TUE	OOPS	CE		DPSD	DS	DM		....INTERPERSONAL LAB...		
WED	DM	DPSD		OOPS	DS	CE		.....DS/DIGITAL LAB...		
THUR	DPSD	DM		DM	OOPS	DS		T&P	ASSO	MENT
FRI	CE	DPSD		DS	CE	OOPS		.....DIGITAL/DS LAB...		
SAT	DM	DS		CE	OOPS	DPSD		....OOPS LAB....		

Sl.No	SUBJECT CODE	SUBJECT TITLE	HANDLING STAFF NAME
1	MA8351	DISCRETE MATHEMATICS	Mrs.N.SIVAMANI,AP/MATHS
2	CS8351	DIGITAL PRINCIPLES AND SYSTEM DESIGN	Mrs.T.ARACHELVI,AP/ECE
3	CS8391	DATA STRUCTURES	Mrs.R.SHENBAGAVALLI,AP/CSE
4	CS8392	OBJECT ORIENTED PROGRAMMING	Mrs.G.KOKILA,AP/CSE
5	EC8395	COMMUNICATION ENGINEERING	Mrs.N.NAGAMMAI,AP/ECE
6	CS8381	DATA STRUCTURES LABORATORY	Mrs.R.SHENBAGAVALLI,AP/CSE
7	CS8383	OBJECT ORIENTED PROGRAMMING LABORATORY	Mrs.G.KOKILA,AP/CSE
8	CS8382	DIGITAL SYSTEMS LABORATORY	Mrs.T.ARACHELVI,AP/ECE
9	ASSO	ASSOCIATION	Mrs.G.KOKILA AP/CSE
10	T&P	TRAINING & PLACEMENT	Mr.C.SATHISHKUMAR,AP/CSE
12	MENT	MENTORS	Mrs.R.SHENBAGAVALLI,AP/CSE, Mr.R.GANESH,AP/CSE
13		TUTORS	Mrs.R.SHENBAGAVALLI,AP/CSE, Mr.R.GANESH,AP/CSE

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE-641654
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
ODD SEMESTER

DEPARTMENT	CSE	ACADEMIC YEAR	2021-2022
CLASS ROOM	A-109	YEAR,BRANCH&SECTION	III CSE
SEMESTER	V	WITH EFFECT FROM	18.08.2021

HOUR / DAY	1 9.00-9.45	2 9.45-10.35	BREAK	3 10.50-11.40	4 11.40-12.30	5 12.30-1.20	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON	GIS	MP		TOC	ANT	CN		.....MP LAB...		
TUE	TOC	ANT		CN	GIS	TOC		.....CN LAB....		
WED	MP	CN		OOAD	MP	ANT		.....OOAD LAB.....		
THUR	OOAD	CN		ANT	OOAD	GIS		.....MP LAB...		
FRI	ANT	GIS		OOAD	TOC	MP		.....CN LAB....		
SAT	CN	TOC		MP	GIS	OOAD		.....OOAD LAB.....		

Sl.No	SUBJECT CODE	SUBJECT TITLE	HANDLING STAFF NAME
1	MA8551	ALGEBRA AND NUMBER THEORY	Mrs.THIRUNAMAKANI, AP/MATHS
2	CS8591	COMPUTER NETWORKS	Mrs.P.DIVYA,AP/CSE
3	EC8691	MICROPROCESSOR AND MICROCONTROLLER	Mr.PONNEELA VIGNESH,AP/CSE
4	CS8501	THEORY OF COMPUTATION	Mrs.R.KOKILA,AP/CSE
5	CS8592	OBJECT ORIENTED ANALYSIS AND DESIGN	Mrs.V.SARANYA,AP/CSE
6	OCE552	GEOGRAPHIC INFORMATION SYSTEM	Mr.R.GANESH,AP/CSE
7	CS8582	OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY	Mrs.V.SARANYA,AP/CSE
8	EC8681	MICROPROCESSOR AND MICROCONTROLLERS LABORATORY	Mr.PONNEELAVIGNESH,AP/CSE
9	CS8581	NETWORKS LABORATORY	Mrs.P.DIVYA,AP/CSE
10		TUTORS	Mrs.R.SIVARANJANI,AP/CSE

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE-641654
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
ODD SEMESTER

DEPARTMENT	CSE	ACADEMIC YEAR	2021-2022
CLASS ROOM	A 112	YEAR/BRANCH&SECTION	IV CSE
SEMESTER	VII	WITH EFFECT FROM	18.08.2021

HOUR / DAY	1 9.00-9.45	2 9.45-10.35	BREAK	3 10.50-11.40	4 11.40-12.30	5 12.30-1.20	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON	POM	CNS		HCI	SPM	CC		---CC LAB--		
TUE	ESIA	SPM		CC	POM	HCI		.....CNS LAB.....		
WED	SPM	CC		ESIA	HCI	POM		.....CNS LAB.....		
THUR	CC	POM		SPM	ESIA	CNS		---CC LAB--		
FRI	HCI	ESIA		POM	CNS	ESIA		T&P	T&P	LIB
SAT	CNS	CC		CNS	HCI	SPM		ASSO	ASSO	MENT

Sl.No	SUBJECT CODE	SUBJECT TITLE	HANDLING STAFF NAME
1	MG8591	PRINCIPLES OF MANAGEMENT	Mrs.R.KOKILA,AP/CSE
2	CS8792	CRYPTOGRAPHY AND NETWORK SECURITY	Mrs.R.SIVARANJANI,AP/CSE
3	CS8791	CLOUD COMPUTING	Mr.R.GANESH,AP/CSE
4	CS8079	HUMAN COMPUTER INTERACTION	Dr.R.SIVAKUMAR,HOD/S&H
5	IT8075	SOFTWARE PROJECT MANAGEMENT	Mr.V.ARUN KUMAR,AP/CSE
6	OCE751	ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT	Dr.A.S.SHANTHI,HOD/CSE
7	CS8711	CLOUD COMPUTING LABORATORY	Mr.R.GANESH,AP/CSE
8	IT8761	SECURITY LABORATORY	Mrs.R.SIVARANJANI,AP/CSE
9	ASSOC	ASSOCIATION	Mrs.R.KOKILA AP/CSE Mrs.R.SHENBAGAVALLI,AP/CSE
10	T&P	TRAINING & PLACEMENT	Mrs.R.SIVARANJANI,AP/CSE
11	LIB	LIBRARY	Mrs.T.RAMYA AP/CSE
12	MENT	MENTORS	Mr.V.ARUN KUMAR,AP/CSE
13		TUTORS	Mr.V.ARUN KUMAR,AP/CSE

TIMETABLE I/C	HoD / COORDINATOR	T.T. Coordinator	PRINCIPAL
TR	A.S.V.		

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE-641654
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
ODD SEMESTER

DEPARTMENT	CSE	ACADEMIC YEAR	2021-2022
CLASS ROOM	A-110	YEAR,BRANCH&SECTION	II ME CSE
SEMESTER	III	WITH EFFECT FROM	18.08.2021

HOUR	1 9.00-9.45	2 9.45-	BREAK	3 10.50-	4 11.40-	5 12.30-	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON	SQA	BIC		MAD	SQA	BIC		SQA	MAD	BIC
TUE	BIC	SQA		BIC	MAD	MAD		PROJECT PHASE		
WED	PROJECT PHASE			PROJECT PHASE				PROJECT PHASE		
THUR	PROJECT PHASE			PROJECT PHASE				PROJECT PHASE		
FRI	PROJECT PHASE			PROJECT PHASE				PROJECT PHASE		
SAT	PROJECT PHASE			PROJECT PHASE				PROJECT PHASE		

Sl.No	SUBJECT CODE	SUBJECT TITLE	HANDLING STAFF
1	CP5005	SOFTWARE QUALITY ASSURANCE AND TESTING	Dr.M.KARTHIKEYAN
2	CP5007	BIO-INSPIRED COMPUTING	Dr.S.LATHA SHANMUGA VADIVU
3	CP5097	MOBILE APPLICATION DEVELOPMENT	Dr.A.S.SHANTHI
4	CP5311	PROJECT WORK PHASE-1	Dr.A.S.SHANTHI

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE-641659
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

FACULTY NAME:A.S.SHANTHI,HOD/CSE
SUBJECT NAME WITH CLASS:
1.ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT(IV CSE)
2.MOBILE APPLICATION DEVELOPMENT(II ME)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35	BREAK	3 10.50-11.40	4 11.40-12.30	5 12.30-1.20	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON				MAD II ME					MAD II ME	
TUE	ESIA IV CSE				MAD II ME	MAD II ME		.....PROJECT PHASE -1....		
WED				ESIA IV CSE						
THUR								ESIA IV CSE		
FRI		ESIA IV CSE						ESIA IV CSE		
SAT										

TOTAL HOURS : =9+3=12

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL
TRI T.	A.S.S.		

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE-641659
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Mrs.V.SARANYA
SUBJECT NAME WITH CLASS:
1. OBJECT ORIENTED ANALYSIS AND DESIGN(III CSE)
2. OBJECT ORIENTED ANALYSIS AND DESIGN LAB(III CSE)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35		3 10.50-11.40	4 11.40-12.30	5 12.30-1.20		6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON										
TUE										
WED				OOAD III CSE				...OOAD LAB...III CSE		
THUR	OOAD III CSE				OOAD III CSE					
FRI				OOAD III CSE						
SAT						OOAD III CSE		...OOAD LAB...III CSE		

TOTAL:5+6=11

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL
TRI T.	A.S.T.		

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE-641659
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Mrs.N.SATHYA
SUBJECT NAME WITH CLASS:
1.FUNDAMENTALS OF DATA STRUCTURES IN C(II ECE)
2..FUNDAMENTALS OF DATA STRUCTURES IN C LAB(II ECE)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35	BREAK	3 10.50-11.40	4 11.40-12.30	5 12.30-1.20	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON						FDS II ECE		...FDS LAB...		
TUE										
WED				FDS II ECE						
THUR		FDS II ECE								
FRI	FDS II ECE							...FDS LAB...		
SAT					FDS II ECE					

TOTAL HOURS:5+6=11

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING,
COIMBATORE-641659
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : MrsP.DIVYA,AP/CSE
SUBJECT NAME WITH CLASS:
1.COMPUTER NETWORK(IIICSE)
2.COMPUTER NETWORK LAB(IIICSE)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35	BREAK	3 10.50-11.40	4 11.40-12.30	5 12.30-1.20	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON						CN III CSE				
TUE				CN III CSE				….CN LAB..III CSE		
WED		CN III CSE								
THUR		CN III CSE								
FRI								….CN LAB..III CSE		
SAT	CN III CSE									

TOTAL HOURS 5+6=11

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING,
COIMBATORE-641659
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Mr.C.SATHISHKUMAR,AP/CSE
SUBJECT NAME WITH CLASS:
1. OOPS(III EEE & II ICE)
2. OOPS LAB(III EEE & II ICE)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35		3 10.50-11.40	4 11.40-12.30	5 12.30-1.20		6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON	OOPS II ICE,III EEE	OOPS II ICE,III EEE	BREAK	OOPS II ICE,III EEE	OOPS II ICE,III EEE	OOPS II ICE,III EEE	LUNCH	....OOPS LAB....II ICE III EEE		
TUE										
WED										
THUR								T&P II CSE		
FRI										
SAT								....OOPS LAB....II ICE III EEE		

TOTAL HOURS :6+6+1=13

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE-641659
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Mrs.R.KOKILA AP/CSE
SUBJECT NAME WITH CLASS:
1.THEORY OF COMPUATION(III CSE)
2. PRINCIPLES OF MANAGEMENT(IV CSE)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35	BREAK	3 10.50-11.40	4 11.40-12.30	5 12.30-1.20	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON	POM IV CSE			TOC III CSE						
TUE	TOC III CSE				POM IV CSE					
WED						POM IV CSE				
THUR		POM IV CSE								
FRI				POM IV CSE	TOC III CSE			T&P IV CSE		
SAT		TOC III CSE							ASSO IV CSE	

TOTAL HOURS :9+2=11

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Mr.PONNEELA VIGNESH AP/CSE
SUBJECT NAME WITH CLASS:
1.MICROPROCESSOR AND MICROCONTROLLERS (III CSE)
2. MICROPROCESSOR AND MICROCONTROLLERS LABORATORY(III CSE)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35	BREAK	3 10.50-11.40	4 11.40-12.30	5 12.30-1.20	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON		MP III CSE						...MP LAB..III CSE		
TUE										
WED	MP III CSE									
THUR								...MP LAB..III CSE		
FRI						MP III CSE				
SAT				MP III CSE						

TOTAL HOURS :4+6=10

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Mrs.G.KOKILA AP/CSE
SUBJECT NAME WITH CLASS:
1.OBJECT ORIENTED PROGRAMMING(II CSE)
2.OBJECT ORIENTED PROGRAMMING LAB(II CSE)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35		3 10.50-11.40	4 11.40-12.30	5 12.30-1.20		6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON		OOPS II CSE						...OOPS LAB.. II CSE		
TUE	OOPS II CSE									
WED				OOPS II CSE						
THUR			BREAK		OOPS II CSE		LUNCH		ASSO II CSE	
FRI						OOPS II CSE				
SAT					OOPS II CSE			...OOPS LAB.. II CSE		

TOTAL HOURS :6+6+1=13

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL
TT-1			

TAMILNADU COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Mrs.R.SIVARANJANI AP/CSE
SUBJECT NAME WITH CLASS:
1.CRYPTOGRAPHY AND NETWORK SECURITY(IV CSE)
2.CRYPTOGRAPHY AND NETWORK SECURITY LAB(IV CSE)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35		3 10.50-11.40	4 11.40-12.30	5 12.30-1.20		6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON		CNS IV CSE								
TUE								...CNS LAB..IV CSE		
WED			BREAK				LUNCH	...CNS LAB..IV CSE		
THUR						CNS IV CSE				
FRI					CNS IV CSE				T&P IV CSE	
SAT	CNS IV CSE			CNS IV CSE						

TOTAL HOURS :5+6+1=11

TUTOR:III CSE

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL
TR-T.	A.S.D.	L.Rani	

TAMILNADU COLLEGE OF ENGINEERING,
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING,
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Mr.V.ARUNKUMAR, AP/CSE
SUBJECT NAME WITH CLASS:
1.SOFTWARE PROJECT MANAGEMENT(IV CSE)
2.PROBLEM SOLVING AND PYTHON PROGRAMMING(FIRST YEAR B SECTION)
3. PROBLEM SOLVING AND PYTHON PROGRAMMING LAB(FIRST YEAR B SECTION)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35	BREAK	3 10.50-11.40	4 11.40-12.30	5 12.30-1.20	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON					SPM IV CSE					
TUE		SPM IV CSE								
WED	SPM IV CSE									
THUR				SPM IV CSE						
FRI										
SAT						SPM IV CSE				MENT IV CSE

TUTOR:IV CSE
TOTAL HOURS :5+5+6+1=17

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Mr.R.GANESH AP/CSE
SUBJECT NAME WITH CLASS:
1.GEOGRAPHIC INFORMATION SYSTEM(III CSE)
2.CLOUD COMPUTING(IV CSE)
3.CLOUD COMPUTING LAB(IV CSE)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35	BREAK	3 10.50-11.40	4 11.40-12.30	5 12.30-1.20	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON	GIS III CSE					CC IV CSE		....CC LAB...IV CSE		
TUE				CC IV CSE	GIS III CSE					
WED		CC IV CSE								
THUR	CC IV CSE					GIS III CSE		....CC LAB...IV CSE		
FRI		GIS III CSE								
SAT		CC IV CSE			GIS III CSE					

TOTAL HOURS :10+6=16

TUTOR:II CSE

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Mrs.T.RAMYA AP/CSE
SUBJECT NAME WITH CLASS:
1.PROBLEM SOLVING AND PYTHON PROGRAMMING(FIRST YEAR C SECTION)
2. PROBLEM SOLVING AND PYTHON PROGRAMMING LAB(FIRST YEAR C SECTION)
3.PROBLEM SOLVING AND PYTHON PROGRAMMING LAB(FIRST YEAR A SECTION)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35		3 10.50-11.40	4 11.40-12.30	5 12.30-1.20		6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON		PSPP I YEAR C SEC						...PSPPP LAB..SEC A		
TUE	PSPP I YEAR C SEC									
WED		PSPP I YEAR C SEC	BREAK				LUNCH	...PSPPP LAB..SEC A		
THUR		PSPP I YEAR C SEC						...PSPPP LAB..SEC C		
FRI					PSPP I YEAR C SEC					LIB IV CSE
SAT								...PSPPP LAB..SEC C		
										TOTAL HOURS :5+12+1=18

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Dr.M.KARTHIKEYAN Prof/CSE
SUBJECT NAME WITH CLASS:
1.SOFTWARE QUALITY ASSURANCE AND TESTING(II ME CSE)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35	BREAK	3 10.50-11.40	4 11.40-12.30	5 12.30-1.20	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON	SQA				SQA			SQA		
TUE		SQA								
WED										
THUR										
FRI										
SAT										

TOTAL HOURS :4

TIMETABLE	HOD	TT	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Dr.S.LATHA SHANMUGA VADIVU Prof/CSE
SUBJECT NAME WITH CLASS:
I.BIO-INSPIRED COMPUTING(II ME CSE)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35	BREAK	3 10.50-11.40	4 11.40-12.30	5 12.30-1.20	LUNCH	6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON		BIC				BIC				BIC
TUE	BIC			BIC						
WED										
THUR										
FRI										
SAT										

TOTAL HOURS :5

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

STAFF NAME : Mrs.R.SHENBAGAVALLI AP/CSE
SUBJECT NAME WITH CLASS:
1.DATA STRUCTURES(II CSE)
2.DATA STRUCTURES LAB(II CSE)

DAY / HOUR	1 9.00-9.45	2 9.45-10.35		3 10.50-11.40	4 11.40-12.30	5 12.30-1.20		6 2.15-3.00	7 3.00-3.45	8 3.45-4.30
MON	DS II CSE									
TUE					DS II CSE					
WED					DS II CSE			...DS LAB...II CSE		
THUR			BREAK			DS II CSE	LUNCH			MENT II CSE
FRI				DS II CSE				...DS LAB...II CSE		
SAT		DS II CSE						ASSO IV CSE		

TOTAL HOURS :6+6+2=14

TUTOR:II CSE

TIMETABLE I/C	HOD	TT COORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641 659

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022-ODD SEMESTER

IV EEE VII SEMESTER WITH EFFECT FROM 15.11.2021 –VERSION-1

(OFFLINE MODE)

HOUR/ DAY	1 9.00-9.45	2 9.45-10.30		3 10.45-11.30	4 11.30-12.15	5 12.15 - 1.00		6 2.00-2.45	7 2.45-3.30	8 3.30-4.15
MON	DM	PST	B	AMI	PSOC	RES	L	PSS LAB		
TUE	PSOC	AMI	R	DM	HVE	PST	U	RES LAB		
WED	AMI	DM	E	PSOC	RES	HVE	N	PSS LAB		
THUR	PST	HVE	A	RES	DM	AMI	C	RES LAB		
FRI	HVE	RES	K	PST	PSOC	DM	H	PSS LAB		
SAT	RES	AMI		HVE	PST	PSOC		RES LAB		

S. No	SUBJECTS	FACULTY
1	High Voltage Engineering	Mr.T.Sudhakar
2	Power System Operation &Control	Mrs.G.Ramya
3	Renewable Energy Systems	Mr.M.PradeepKumar
4	Analytical Methods & Inst.	Mr.P.Sakthivel
5	Disaster Management	Mr.S.M.Devasugan
6	Power Systems Transients	Mrs.B.ChristyJuliet
7	Power System Simulation Lab	Mrs.G.Ramya
8	Renewable Energy Resources Lab	Mr.P.Sakthivel
9	Tutor	Mrs.B.ChristyJuliet

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641 659

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022-ODD SEMESTER

II EEE III SEMESTER WITH EFFECT FROM 15.11.2021 –VERSION-1

(OFFLINE MODE)

HOUR/DAY	1 9.00-9.45	2 9.45-10.30		3 10.45-11.30	4 11.30-12.15	5 12.15 - 1.00		6 2.00-2.45	7 2.45-3.30	8 3.30-4.15
MON	TPDE	PPE	B	EMT	EDC	DLC	L	ES LAB		
TUE	EMT	TPDE	R	DLC	PPE	EM-I	U	EM-I LAB		
WED	PPE	EMT	E	EM-I	TPDE	EDC	N	ES LAB		
THUR	DLC	EDC	A	PPE	EM-I	TPDE	C	EM-I LAB		
FRI	EDC	DLC	K	TPDE	EMT	EM-I	H	ES LAB		
SAT	EM-I	TPDE		EDC	DLC	EMT		EM-I LAB		

S. No	SUBJECTS	FACULTY
1	TPDE	Mrs.C.Ruby Sharmila
2	Digital Logic Circuits	Ms.M.V.Ramya
3	Electromagnetic Theory	Mrs.B.ChristyJuliet
4	Electrical Machines -I	Mr.T.Sudhakar
5	Electron Devices & Circuits	Mr.P.Sakthivel
6	Power Plant Engineering	Mr.S.M.Devasugan
7	Electronics Lab	Ms.S.Priyadharshini
8	Electrical Machines Lab-1	Mr.M.PradeepKumar
9	Tutor	Ms.S.Priyadharshini

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641 659

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022-ODD SEMESTER

III EEE V SEMESTER WITH EFFECT FROM 15.11.2021 –VERSION-1

(OFFLINE MODE)

HOUR/ DAY	1 9.00-9.45	2 9.45-10.30	BREAK	3 10.45-11.30	4 11.30-12.15	5 12.15 - 1.00	LUNCH	6 2.00-2.45	7 2.45-3.30	8 3.30-4.15
MON	PSA	OOPS		PE	BMI	DSP		C&I LAB		
TUE	OOPS	PE		MP&MC	DSP	PSA		OOPS LAB		
WED	MP&MC	DSP		OOPS	PSA	BMI		PC LAB		
THUR	PE	MP&MC		BMI	OOPS	PSA		C&I LAB		
FRI	BMI	MP&MC		DSP	PE	OOPS		OOPS LAB		
SAT	DSP	BMI		PSA	MP&MC	PE		PC LAB		

S. No	SUBJECTS	FACULTY
1	Power System Analysis	Mrs.G.Ramya
2	Microprocessors & Microcontrollers	Mr.S.Vivek
3	Power Electronics	Mr.M.PradeepKumar
4	Digital Signal Processing	Ms.S.Priyadharshini
5	Object Oriented Programming	Mr.Arunkumar
6	Basics of BMI	Dr.S.Lathashanmugavadivu
7	Control & Instrumentation Lab	Mrs.R.Gokila
8	Professional Communication Lab	Mr.K.Saravanan
9	Object Oriented Programming Lab	Mr.Arunkumar
10	Tutor	Mr.P.Sakthivel

TIME TABLE I/C	HoD	TT CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641 659
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

New Heights Old Tradition

Dr.G.SARAVANAKUMAR., M.E., Ph.D
1) Instrumentation in Petrochemical Industries / IV ICE
2) Process Control /III ICE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY		III ICE								
TUESDAY	III ICE				IV ICE					
WEDNESDAY						IV ICE				
THURSDAY	IV ICE			III ICE						
FRIDAY		IV ICE			III ICE					
SATURDAY				IV ICE		III ICE				

TOTAL HOURS =10

TIME TABLE INCHARGE	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641 659
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

New Heights Old Tradition

Mrs. G.RAMYA M.E.,
1) Power System Operation and Control /IV EEE
2) Power System Analysis /III EEE
3) Power System Simulation Lab / IV EEE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY				III EEE	IV EEE			IV EEE LAB		
TUESDAY	IV EEE					III EEE				
WEDNESDAY				IV EEE	III EEE			IV EEE LAB		
THURSDAY						III EEE				
FRIDAY					IV EEE			IV EEE (L)		
SATURDAY				III EEE		IV EEE				

TOTAL HOURS =17

TIME TABLE INCHARGE	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641 659
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

Mr. S.M.DEVASUGAN M.E.,
1) Disaster Management /IV EEE, ECE & ICE
2) Power Plant Engineering /II EEE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY	IV Year	II EEE								
TUESDAY				IV Year	II EEE					
WEDNESDAY	II EEE	IV Year								
THURSDAY				II EEE	IV Year					
FRIDAY						IV Year				
SATURDAY										

TOTAL HOURS=9

TIME TABLE INCHARGE	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641 659
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

Mr.T.SUDHAKAR., M.E.,
1) High Voltage Engineering /IV EEE
2) Electrical Machines-I /II EEE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY										
TUESDAY					IV EEE	II EEE				
WEDNESDAY				II EEE		IV EEE				
THURSDAY		IV EEE			II EEE					
FRIDAY	IV EEE					II EEE			IV EEE (T&P)	
SATURDAY	II EEE			IV EEE						

TOTAL HOURS =12

TIME TABLE INCHARGE	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641 659
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

New Heights, Old Tradition

Mr.M.PRADEEPKUMAR., M.E.,
1) Renewable Energy Systems /IV EEE
2) Power Electronics /III EEEE
3) Electrical Machines Lab -I /II EEE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY				III EEE		IV EEE		II EEE ASSO		
TUESDAY		III EEE						II EEE LAB		
WEDNESDAY					IV EEE			III EEE(T&P)		
THURSDAY	III EEE			IV EEE				II EEE LAB		
FRIDAY		IV EEE		III EEE						
SATURDAY	IV EEE					III EEE				

TOTAL HOURS =19

TIME TABLE INCHARGE	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641 659
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

New Heights Old Tradition

Mr.S.VIVEK., M.E.,
1) Microprocessors and Microcontrollers /III EEE & ICE
2) Electrical Drives and Control /II MECH
3) Microprocessors and Microcontrollers Lab /III ICE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY				II MECH						
TUESDAY	II MECH			III EEE & ICE				III ICE LAB		
WEDNESDAY	III EEE & ICE	II MECH							II EEE (T&P)	
THURSDAY		III EEE & ICE			II MECH			III ICE LAB		
FRIDAY		III EEE & ICE				II MECH				
SATURDAY					III EEE & ICE	II MECH				

TOTAL HOURS =19

TIME TABLE INCHARGE	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641 659
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

Ms.M.V.RAMYA., M.E.,
1) Automotive Electrical and Electronics / III AUTO
2) Digital Logic Circuits /II EEE & ICE
3) Automotive Electrical and Electronics Laboratory /III AUTO

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30		3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00		6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY			TEA BREK	III AUTO		II EEE & ICE	LUNCH	III AUTO LAB		
TUESDAY	III AUTO			II EEE & ICE						
WEDNESDAY								III AUTO LAB		
THURSDAY	II EEE & ICE				III AUTO					
FRIDAY		II EEE & ICE		III AUTO						
SATURDAY					II EEE & ICE	III AUTO				
								TOTAL HOURS =20		

TIME TABLE INCHARGE	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641 659
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

Ms.S.PRIYADHARSHINI ., M.E.,
1) Digital Image Processing /IV ICE
2) Digital Signal Processing /III EEE
3) Electronics Laboratory / II EEE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30		3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00		6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY		IV ICE	TEA BREAK			III EEE	LUNCH	II EEE LAB		
TUESDAY					III EEE					
WEDNESDAY		III EEE				IV ICE				
THURSDAY				IV ICE						
FRIDAY	IV ICE			III EEE				II EEE LAB		
SATURDAY	III EEE					IV ICE				
								TOTAL HOURS = 17		

TIME TABLE INCHARGE	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD ODD SEMESTER

Mr.P.SAKTHIVEL., M.E.,
1) Analytical Measurements and Instrumention /IV EEE & ICE
2) Electrical Devices and Circuits /II EEE & ICE
3) Renewable Energy Systems Lab /IV EEE

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30		3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00		6 2.00 – 2.50	7 2.50 – 03.40	8 03.40 – 04.30
MONDAY			TEA BREAK	IV EEE & ICE	II EEE & ICE		LUNCH			
TUESDAY		IV EEE & ICE						IV EEE LAB		
WEDNESDAY	IV EEE & ICE					II EEE & ICE				III EEE (M)
THURSDAY		II EEE & ICE				IV EEE & ICE		IV EEE LAB		
FRIDAY	II EEE & ICE									
SATURDAY		IV EEE & ICE		II EEE & ICE						

TOTAL HOURS =17

TIME TABLE INCHARGE	HOD	TIME TABLE CO-ORDINATOR	PRINCIPAL

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641659
DEPARTMENT OF MECHANICAL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-22
ODD SEMESTER

DEPARTMENT	MECHANICAL	ACADEMIC YEAR	2021-22
CLASS ROOM	A-309	YEAR, BRANCH & SECTION	II MECH
SEMESTER	III	WITH EFFECT FROM	18.08.2021

HOUR / DAY	1	2	3	4	5	6	7	8
MONDAY	TPDE	ETD	EDC	FMM	MTI	ISLS LAB		LIB
TUESDAY	EDC	TPDE	MTI	ETD	FMM	EE LAB		MENT
WEDNESDAY	MTI	EDC	FMM	TPDE	ETD	MT I LAB		PROJ
THURSDAY	FMM	MTI	ETD	EDC	TPDE	EE LAB		ASSO
FRIDAY	ETD	FMM	TPDE	T&P	CAMD LAB			
SATURDAY	ETD	TPDE	MTI	FMM	EDC	MT I LAB		ASSO

S.NO.	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	MA8353	Transforms and Partial Differential Equations (TPDE)	Mrs.C.RubySharmila
2	ME8391	Engineering Thermodynamics (ETD)	Mr. P. Ravichandran
3	CE8394	Fluid Mechanics and Machinery (FMM)	Mr. S. ArunBabu
4	ME8351	Manufacturing Technology - I (MT I)	Mr.L.C.Gokul
5	EE8353	Electrical Drives and Controls (EDC)	Mr, S. Vivek
6	ME8361	Manufacturing Technology Laboratory- I (MT I LAB)	Mr.Satheesh kumar
7	ME8381	Computer aided machine drawing Laboratoryv(CAMD LAB)	Mr.P.Duraimurugan
8	EE8361	Electrical Engineering Laboratory (EE LAB)	MrS.Christy juliet
9	HS8381	Interpersonal Skills / Listening & Speaking (ISLS)	Mr. K.Saravanan
10		Association (ASSO)	Mr. P. Ravichandran
11		Mentoring (MENT)	Mr.G.Piruthiviram
12		Training & Placement (T&P)	Mr.P.Ramakrishnan
13		Library (LIB)	Mr.R.Manivannan
14		Project (PROJ)	Mr.N.Senthil

Time Table Incharge	HOD	Coordinator	Principal
G. Raj			

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641659
DEPARTMENT OF MECHANICAL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-22
ODD SEMESTER

DEPARTMENT	MECHANICAL	**ACADEMIC YEAR**	2021-22
CLASS ROOM	A-310	**YEAR, BRANCH & SECTION**	III MECH
SEMESTER	V	**WITH EFFECT FROM**	18.08.2021

HOUR / DAY	1	2	3	4	5	6	7	8
MONDAY	TEII	DME	RES	M&M	DOM	KD LAB		T&P
TUESDAY	RES	TEII	DOM	DME	M&M	TE LAB		LIB
WEDNESDAY	DOM	RES	M&M	TEII	DME	M&M LAB		ASSO
THURSDAY	M&M	DOM	DME	RES	TEII	KD LAB		MENT
FRIDAY	DME	M&M	TEII	DOM	RES	TE LAB		PROJ
SATURDAY	TEII	DME	RES	M&M	DOM	M&M LAB		ASSO

S.NO.	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	ME8595	Thermal Engineering- II (TE II)	Mr.G.Piruthiviram
2	ME8593	Design of Machine Elements (DME)	Mr.L.C.Gokul
3	ME8501	Metrology and Measurements (M&M)	Mr.C.Elango
4	ME8594	Dynamics of Machines (DOM)	Mr.T.Prabhakaran
5	ORO551	Renewable Energy Sources (RES)	Mr.S.A.Gokulakrishnan
6	ME8511	Kinematics and Dynamics Laboratory (KD LAB)	Mr.N.Senthil
7	ME8512	Thermal Engineering Laboratory (TE LAB)	Mr.G.Piruthiviram
8	ME8513	Metrology and Measurements Laboratory (M&M LAB)	Mr.T.Prabhu
9		Association (ASSO)	Mr.S.A.Gokulakrishnan
10		Mentoring (MENT)	Mr.R.Manivannan
11		Training & Placement (T&P)	Mr.T.Prabhu
12		Library (LIB)	Mr.T.Prabhu
13		Project (PROJ)	Mr.R.Manivannan

Time Table Incharge	HOD	Coordinator	Principal

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641659
DEPARTMENT OF MECHANICAL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021-22
ODD SEMESTER

DEPARTMENT	MECHANICAL	ACADEMIC YEAR	2021-22
CLASS ROOM	A-312	YEAR, BRANCH & SECTION	IV MECH
SEMESTER	VII	WITH EFFECT FROM	18.08.2021

HOUR / DAY	1	2	3	4	5	6	7	8
MONDAY	PPCE	PPE	ESIA	MTS	UCM	SA LAB		ASSO
TUESDAY	ESIA	PPCE	UCM	PPE	ROB	MTS LAB		PROJ
WEDNESDAY	MTS	PPCE	ROBO	ROBO	PPE	TS		LIB
THURSDAY	PPE	UCM	PPE	ESIA	PPCE	SA LAB		MENT
FRIDAY	UCM	ROBO	MTS	MTS	ESIA	MTS LAB		T&P
SATURDAY	ROBO	ESIA	PPCE	UCM	MTS	TS		ASSO

S.NO.	SUB CODE	SUBJECT NAME	HANDLING STAFF NAME
1	ME8792	Power Plant Engineering (PPE)	Mr.S.A.Gokulakrishnan
2	ME8793	Process Planning and Cost Estimation (PPCE)	Mr.C.Elango
3	ME8791	Mechatronics (MTS)	Mr. P. Ravichandran
4	OCE751	Environmental and Social Impact Assessment (ESIA)	Mr. S. ArunBabu
5	ME8073	Unconventional Machining Processes (UCM)	Dr. P. Dharmalingam
6	ME8099	Robotics (ROB)	Mr.T.Prabhakaran
7	ME8711	Simulation and Analysis Laboratory (SA LAB)	Mr.P.Elavarasan
8	ME8781	Mechatronics Laboratory (MTSLAB)	Mr.P.Ramakrishnan
9	ME8712	Technical Seminar (TS)	Mr.R.Manivannan
10		Association (ASSO)	Mr. S. ArunBabu
11		Mentoring (MENT)	Mr.L.C.Gokul
12		Training & Placement (T&P)	Mr.T T Satheesh kumar
13		Library (LIB)	Mr.P.Ramakrishnan
14		Project (PROJ)	Mr.P.Elavarasan

Time Table Incharge	HOD	Coordinator	Principal

New Heights Old Tradition

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF MECHANICAL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021– 2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME OF THE STAFF : **Dr.P.DHARMALINGAM**

SUBJECT NAME WITH CLASS :
1. Unconventional Machining Processes (UCM) - IVMECH

DAY / HOUR	1	2	TEA BREAK	3	4	5	LUNCH	6	7	8
	09.00 – 09.45	09.45 – 10.30		10.45 – 11.30	11.30 – 12.15	12.15 – 01.00		02.00 - 02.50	02.50 – 03.40	03.40 – 04.30
MONDAY						UCM				
TUESDAY				UCM						
WEDNESDAY										
THURSDAY		UCM								
FRIDAY	UCM									
SATURDAY					UCM					

TOTAL HOURS = 5= 5

DEPARTMENT HEAD

TIME TABLE I/C	HOD	TT CO-ORDIANTOR	PRINCIPAL
G. Raj			

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF MECHANICAL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD FOR ODD EMESTER

NAME OF THE STAFF : Mr.S.A.GOKULAKRISHNAN

SUBJECT NAME WITH CLASS :
1.Renewable Energy Sources (RES) - III MECH
2. Power Plant Engineering (PPE)- IV MECH

DAY / HOUR	1	2	TEA BREAK	3	4	5	LUNCH	6	7	8
	09.00 – 09.45	09.45 – 10.30		10.45 – 11.30	11.30 – 12.15	12.15 – 01.00		02.00 - 02.50	02.50 – 03.40	03.40 – 04.30
MONDAY		PPE		RES						
TUESDAY	RES				PPE					
WEDNESDAY		RES				PPE				(ASSO)
THURSDAY	PPE			PPE	RES					
FRIDAY						RES				
SATURDAY				RES						(ASSO)

TOTAL HOURS = 5+ 6 + 2 = 13

Association (ASSO)

TIME TABLE I/C	HOD	TT CO-ORDIANTOR	PRINCIPAL
G. Raj			

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE - 641 659
DEPARTMENT OF MECHANICAL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021- 2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME OF THE STAFF : Mr P.RAVICHANDRAN

SUBJECT NAME WITH CLASS
1 Engineering Thermodynamics (ETD)
2.Mechatronics (MTS)

DAY / HOUR	1	2		3	4	5		6	7	8
	09.00 – 09.45	09.45 – 10.30		10.45 – 11.30	11.30 – 12.15	12.15 – 01.00		02.00 - 02.50	02.50 – 03.40	03.40 – 04.30
MONDAY		ETD	TEA BREAK		MTS		LUNCH			
TUESDAY					ETD					
WEDNESDAY	MTS					ETD				
THURSDAY				ETD						ASSO
FRIDAY	ETD			MTS	MTS					
SATURDAY	ETD					MTS				ASSO

TOTAL HOURS =6+5+2= 13

Association (ASSO)-II MECH

TIME TABLE I/C	HOD	TT CO-ORDIANTOR	PRINCIPAL
G. Raj			

TAMILNADU COLLEGE OF ENGINEERING,
COIMBATORE – 641 659
DEPARTMENT OF MECHANICAL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021– 2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME OF THE STAFF : Mr.S.ARUN BABU

SUBJECT NAME WITH CLASS :
1. Fluid Mechanics and Machinery (FMM)-II MECH
2. Environmental and Social Impact Assessment (ESIA)-IV MECH

DAY / HOUR	1	2		3	4	5		6	7	8
	09.00 – 09.45	09.45 – 10.30		10.45 – 11.30	11.30 – 12.15	12.15 – 01.00		02.00 - 02.50	02.50 – 03.40	03.40 – 04.30
MONDAY			TEA BREAK	ESIA	FMM		LUNCH			ASSO
TUESDAY	ESIA					FMM				
WEDNESDAY				FMM						
THURSDAY	FMM				ESIA					
FRIDAY		FMM				ESIA				
SATURDAY		ESIA			FMM					ASSO

TOTAL HOURS = 5+6+2=13

Association (ASSO)-IV MECH

TIME TABLE I/C	HOD	TT CO-ORDIANTOR	PRINCIPAL
G. Raj			

TAMILNADU COLLEGE OF ENGINEERING,
COIMBATORE – 641 659
DEPARTMENT OF MECHANICAL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME OF THE STAFF : Mr.T.PRABHAKARAN

SUBJECT NAME WITH CLASS
1. Dynamics of Machines (DOM)-III MECH
2. Robotics (ROB)-IV MECH

DAY / HOUR	1	2	TEA BREAK	3	4	5	LUNCH	6	7	8
	09.00 – 09.45	09.45 – 10.30		10.45 – 11.30	11.30 – 12.15	12.15 – 01.00		02.00 – 02.50	02.50 – 03.40	03.40 – 04.30
MONDAY										
TUESDAY				DOM		ROB				
WEDNESDAY	DOM			ROB	ROB					
THURSDAY		DOM								
FRIDAY		ROB			DOM					
SATURDAY	ROB					DOM				

TOTAL HOURS = 5+5 = 10

TIME TABLE I/C	HOD	TT CO-ORDIANTOR	PRINCIPAL
G.Raj			

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF MECHANICAL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021 – 2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME OF THE STAFF : Mr.G.PIRUTHIVIRAM

SUBJECT NAME WITH CLASS :
1 Thermal Engineering- II (TE II)-III MECH
2 Thermal Engineering Laboratory (TE LAB)-III MECH
3

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 02.00 - 02.50	7 02.50 – 03.40	8 03.40 – 04.30
MONDAY	TEII									
TUESDAY		TEII						TE LAB		MENT
WEDNESDAY					TEII					
THURSDAY						TEII				
FRIDAY				TEII				TE LAB		
SATURDAY	TEII									

TOTAL HOURS = 6+4+1=11

Mentoring (MENT)

TIME TABLE I/C	HOD	TT CO-ORDIANTOR	PRINCIPAL
G.Pi			

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF MECHANICAL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021– 2022
STAFF INDIVIDUAL WORKLOAD FOR ODD SEMESTER

NAME OF THE STAFF : Mr..C.ELANGO

SUBJECT NAME WITH CLASS :
1.Metrology and Measurements (M&M) - III MECH
2. Process Planning and Cost Estimation (PPCE) - IV MECH

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 02.00 - 02.50	7 02.50 – 03.40	8 03.40 – 04.30
MONDAY	PPCE				M&M					
TUESDAY		PPCE				M&M				
WEDNESDAY		PPCE		M&M						
THURSDAY	M&M					PPCE				
FRIDAY		M&M								
SATURDAY				PPCE	M&M					

TOTAL HOURS = 6+ 5 = 11

EXAM CELL INCHARGE

TIME TABLE I/C	HOD	TT CO-ORDIANTOR	PRINCIPAL
G. Raj			

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE – 641 659
DEPARTMENT OF MECHANICAL ENGINEERING
TIME TABLE FOR THE ACADEMIC YEAR 2021– 2022
STAFF INDIVIDUAL WORKLOAD FOR ODDSEMESTER

NAME OF THE STAFF : Mr L.C.GOKUL

SUBJECT NAME WITH CLASS :

1. Manufacturing Technology - I (MT I)-II MECH
2.Design of Machine Elements (DME)-III MECH

DAY / HOUR	1 09.00 – 09.45	2 09.45 – 10.30	TEA BREAK	3 10.45 – 11.30	4 11.30 – 12.15	5 12.15 – 01.00	LUNCH	6 02.00 - 02.50	7 02.50 – 03.40	8 03.40 – 04.30
MONDAY		DME				MTI				
TUESDAY				MTI	DME					
WEDNESDAY	MTI					DME				
THURSDAY		MTI		DME						MENT
FRIDAY	DME									
SATURDAY		DME		MTI						

TOTAL HOURS = 6+5+1= 12

Mentoring (MENT)

TIME TABLE I/C	HOD	TT CO-ORDIANTOR	PRINCIPAL
G. Raj			

ANNA UNIVERSITY, CHENNAI

NON - AUTONOMOUS COLLEGES AFFILIATED TO ANNA UNIVERSITY REGULATIONS 2021

B. E. ELECTRONICS AND COMMUNICATION ENGINEERING CHOICE BASED CREDIT SYSTEM

I AND II SEMESTERS CURRICULA AND SYLLABI

I. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

I. To provide the students with a strong foundation in the required sciences in order to pursue studies in Electronics and Communication Engineering.

II. To gain adequate knowledge to become good professional in electronic and communication engineering associated industries, higher education and research.

III. To develop attitude in lifelong learning, applying and adapting new ideas and technologies as their field evolves.

IV. To prepare students to critically analyze existing literature in an area of specialization and ethically develop innovative and research oriented methodologies to solve the problems identified.

V. To inculcate in the students a professional and ethical attitude and an ability visualize the engineering issues in a broader social context.

II. PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Design, develop and analyze electronic systems through application of relevant electronics, mathematics and engineering principles

PSO2: Design, develop and analyze communication systems through application of fundamentals from communication principles, signal processing, and RF System Design & Electromagnetics.

PSO3: Adapt to emerging electronics and communication technologies and develop innovative solutions for existing and newer problems

SEMESTER I

S. NO.	COURSE	COURSE TITLE	CATE-	PERIODS PER WEEK			TOTAL CONTACT	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
THEORY								
2.	HS3151	Professional English - I	HSMC	3	1	0	4	4
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3	0	0	3	3
5.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
6.	GE3151	Problem Solving and Python Programming	ESC	3	0	0	3	3
PRACTICALS								
7.	GE3171	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
8.	BS3171	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
		TOTAL		**15**	**2**	**8**	**25**	**21**

SEMESTER II

S. NO.	COURSE	COURSE TITLE	CATE-	PERIODS PER			TOTAL CONTACT	CREDITS
				L	T	P		
THEORY								
1.	HS3251	Professional English - II	HSMC	3	1	0	4	4
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	PH3254	Physics for Electronics Engineering	BSC	3	0	0	3	3
4.	BE3254	Electrical and Instrumentation Engineering	ESC	3	0	0	3	3
5.	GE3251	Engineering Graphics	ESC	2	0	4	6	4
6.	EC3251	Circuit Analysis	PCC	3	1	0	4	4
7.		NCC Credit Course Level 1*	-	2	0	0	2	2*
PRACTICALS								
8.	GE3271	Engineering Practices Laboratory	ESC	0	0	4	4	2
9.	EC3271	Circuits Analysis Laboratory	PCC	0	0	2	2	1
		TOTAL		**17**	**3**	**10**	**30**	**25**

*NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

IP3151 **INDUCTION PROGRAMME**

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it everyday for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and
also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.
Discussions would be conducted in small groups of about 20 students with a faculty
mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References:
Guide to Induction program from AICTE

HS3151 PROFESSIONAL ENGLISH - I L T P C

3 1 0 4

OBJECTIVES :

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.

- To use language efficiently in expressing their opinions via various media.

INTRODUCTION TO EFFECTIVE COMMUNICATION **1**

What is effective communication? (There are many interesting activities for this.)

Why is communication critical for excellence during study, research and work?

What are the seven C's of effective communication?

What are key language skills?

What is effective listening? What does it involve?

What is effective speaking?
What does it mean to be an excellent reader? What should you be able to do?
What is effective writing?
How does one develop language and communication skills?
What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

UNIT I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION **11**

Listening –for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form
Speaking - Self Introduction; Introducing a friend; Conversation - politeness strategies; Telephone conversation; Leave a voicemail; Leave a message with another person; asking for information to fill details in a form.
Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails.
Writing - Writing emails / letters introducing oneself
Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags
Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II NARRATION AND SUMMATION **12**

Listening - Listening to podcast, anecdotes / stories / event narration; documentaries and interviews with celebrities.
Speaking - Narrating personal experiences / events; Interviewing a celebrity; Reporting / and summarising of documentaries / podcasts/ interviews.
Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs.
Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.)
Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions
Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

UNIT III DESCRIPTION OF A PROCESS / PRODUCT **12**

Listening - Listen to a product and process descriptions; a classroom lecture;and advertisements about a products.
Speaking – Picture description; Giving instruction to use the product; Presenting a product; and Summarising a lecture.
Reading – Reading advertisements, gadget reviews; user manuals.
Writing - Writing definitions; instructions; and Product /Process description.
Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses.
Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words)

UNIT IV CLASSIFICATION AND RECOMMENDATIONS 12

Listening – Listening to TED Talks; Scientific lectures; and educational videos.
Speaking – Small Talk; Mini presentations and making recommendations.
Reading – Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc,.)
Writing – Note-making / Note-taking (*Study skills to be taught, not tested); ; Writing
recommendations; Transferring information from non verbal (chart , graph etc, to verbal mode)
Grammar – Articles; Pronouns - Possessive & Relative pronouns.
Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT V EXPRESSION 12

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions.
Speaking –group discussions, Debates, and Expressing opinions through Simulations & Roleplay.
Reading – Reading editorials; and Opinion Blogs;
Writing – Essay Writing (Descriptive or narrative).
Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences.
Vocabulary - Cause & Effect Expressions – Content vs Function words.

TOTAL : 60 PERIOD

OUTCOMES :

At the end of the course, learners will be able

- To listen and comprehend complex academic texts
- To read and infer the denotative and connotative meanings of technical texts
- To write definitions, descriptions, narrations and essays on various topics
- To speak fluently and accurately in formal and informal communicative contexts
- To express their opinions effectively in both oral and written medium of communication

TEXT BOOKS :

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021.
   Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3. English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill
   Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi,2003.

MA3151 MATRICES AND CALCULUS L T P C
3 1 0 4

OBJECTIVES :

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNITI MATRICES 9+3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications : Stretching of an elastic membrane.

UNITII DIFFERENTIAL CALCULUS 9+3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications : Maxima and Minima of functions of one variable.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9+3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNITIV INTEGRAL CALCULUS 9+3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration : Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications :

Hydrostatic force and pressure, moments and centres of mass.

UNITV MULTIPLE INTEGRALS 9+3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications : Moments and centres of mass, moment of inertia.

TOTAL : 60 PERIODS

OUTCOMES :

At the end of the course the students will be able to

- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Able to use differential calculus ideas on several variable functions.
- Apply different methods of integration in solving practical problems.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS :

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3. James Stewart, "Calculus : Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :

1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
2. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan. S. and Manicavachagom Pillai. T. K.,"Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, " Engineering Mathematics " Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, " Thomas Calculus ", 14th Edition, Pearson India, 2018.

PH3151 ENGINEERING PHYSICS L T P C

3 0 0 3

OBJECTIVES:

- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to be successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNITI MECHANICS 9

Multiparticle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

UNIT II ELECTROMAGNETIC WAVES 9

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium- vacuum interface for normal incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS 9

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference –Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO_2 laser, semiconductor laser –Basic applications of lasers in industry.

UNIT IV BASIC QUANTUM MECHANICS 9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.

UNIT V APPLIED QUANTUM MECHANICS 9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

TOTAL : 45

PERIODS

OUTCOMES:

After completion of this course, the students should be able to

- Understand the importance of mechanics.
- Express their knowledge in electromagnetic waves.
- Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
- Understand the importance of quantum physics.
- Comprehend and apply quantum mechanical principles towards the formation of energy bands.

TEXT BOOKS:

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw-Hill (Indian Edition), 2017.

REFERENCES:

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer-Verlag, 2012.

CY3151 ENGINEERING CHEMISTRY L T P C
3 0 0 3

OBJECTIVES:

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

UNIT I WATER AND ITS TREATMENT 9

Water: Sources and impurities, **Water quality parameters:** Definition and significance of-colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. **Municipal water treatment:** primary treatment and disinfection (UV, Ozonation, break-point chlorination)**.**

Desalination of brackish water: Reverse Osmosis. **Boiler troubles:** Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. **Treatment of boiler feed water**: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralisation and zeolite process.

UNIT II NANOCHEMISTRY 9

Basics: Distinction between molecules, nanomaterials and bulk materials; **Size-dependent properties** (optical, electrical, mechanical and magnetic); **Types of nanomaterials**: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. **Preparation of nanomaterials:** sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. **Applications** of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT III PHASE RULE AND COMPOSITES 9

Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process.

Composites: Introduction: Definition & Need for composites; **Constitution**: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). **Properties and applications of**: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. **Hybrid composites** - definition and examples.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction: Classification of fuels; **Coal and coke**: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). **Petroleum and Diesel:** Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; **Power alcohol and biodiesel.**

Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; **Ignition temperature**: spontaneous ignition temperature, Explosive range; **Flue gas analysis** - ORSAT Method. **CO_2 emission and carbon foot print.**

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Stability of nucleus: mass defect (problems), binding energy;Nuclear energy: light water nuclear power plant, breeder reactor. **Solar energy conversion:** Principle, working and applications of solar cells**; Recent developments in solar cell materials. Wind energy; Geothermal energy;Batteries:** Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion-battery; **Electric vehicles-working principles; Fuel cells:** H_2-O_2 fuel cell, microbial fuel cell; **Supercapacitors:** Storage principle, types and examples.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students will be able:

- To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
- To apply the knowledge of phase rule and composites for material selection requirements.
- To recommend suitable fuels for engineering processes and applications.
- To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

GE3151 PROBLEM SOLVING AND PYTHON PROGRAMMING L T P C

3 0 0 3

OBJECTIVES:

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING 9

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems.
CO2: Develop and execute simple Python programs.

CO3: Write simple Python programs using conditionals and looping for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries etc.
CO6: Read and write data from/to files in Python programs.

TEXT BOOKS:

1. Allen B. Downey, "Think Python : How to Think like a Computer Scientist", 2nd Edition,
   O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data'', Third Edition, MIT Press
   2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill,2018.

HS3251 PROFESSIONAL ENGLISH - II

L	T	P	C
3	1	0	4

COURSE OBJECTIVES

- To engage learners in meaningful language activities to improve their LSRW skills
- To enhance learners' awareness of general rules of writing for specific audiences
- To help learners understand the purpose, audience, contexts of different types of writing
- To develop analytical thinking skills for problem solving in communicative contexts
- To demonstrate an understanding of job applications and interviews for internship and placements

UNIT I MAKING COMPARISONS 12

Listening – Evaluative Listening: Advertisements, Product Descriptions, -Audio / video; Listening and filling a Graphic Organiser (Choosing a product or service by comparison)
Speaking – Marketing a product, Persuasive Speech Techniques.
Reading - Reading advertisements, user manuals, brochures;
Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases
Vocabulary – Contextual meaning of words

UNIT II EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING 12

Listening - Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects - Speaking – Describing and discussing the reasons of accidents or disasters based on news reports.
Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint,

Writing - Writing responses to complaints.

Grammar - Active Passive Voice transformations, Infinitive and Gerunds Vocabulary – Word Formation (Noun-Verb-Adj-Adv), Adverbs.

UNIT III PROBLEM SOLVING 12

Listening – Listening to / Watching movie scenes/ documentaries depicting a technical problem and suggesting solutions.

Speaking – Group Discussion(based on case studies), - techniques and Strategies,

Reading - Case Studies, excerpts from literary texts, news reports etc.,

Writing – Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay

Grammar – Error correction; If conditional sentences

Vocabulary - Compound Words, Sentence Completion.

UNIT IV REPORTING OF EVENTS AND RESEARCH 12

Listening – Listening Comprehension based on news reports – and documentaries – Precis writing, Summarising, Speaking –Interviewing, Presenting an oral report, Mini presentations on select topics;

Reading –Newspaper articles; Writing – Recommendations, Transcoding, Accident Report, Survey Report Grammar – Reported Speech, Modals Vocabulary – Conjunctions- use of prepositions

UNIT V THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY 12

Listening – Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance);

Speaking – Participating in a Role play, (interview/telephone interview), virtual interviews, Making

presentations with visual aids;

Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses Vocabulary – Idioms.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able

- To compare and contrast products and ideas in technical texts.
- To identify cause and effects in events, industrial processes through technical texts
- To analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.
- To report events and the processes of technical and industrial nature.
- To present their opinions in a planned and logical manner, and draft effective resumes in context of job search.

TEXT BOOKS:

1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University.

2. English for Science & Technology Cambridge University Press 2021.Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Krishna Mohan, Meera Banerji, "Developing Communication Skills", Trinity Press, 2017.

MA3251 STATISTICS AND NUMERICAL METHODS

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 9 + 3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS 9 + 3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9 + 3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting -

Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9 +3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9 +3

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations. **TOTAL: 60 PERIODS**

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.
- Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and

Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

PH3254	PHYSICS FOR ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To make the students to understand the basics of crystallography and its importance in studying materials properties.
- To understand the electrical properties of materials including free electron theory, applications of quantum mechanics and magnetic materials.
- To instil knowledge on physics of semiconductors, determination of charge carriers and device applications
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications
- To inculcate an idea of significance of nano structures, quantum confinement and ensuing nano device applications.

UNIT I CRYSTALLOGRAPHY 9

Crystal structures: Crystal lattice – basis - unit cell and lattice parameters – crystal systems and Bravais lattices – Structure and packing fractions of SC, BCC, FCC, diamond cubic, NaCL, ZnS structures – crystal planes, directions and Miller indices – distance between successive planes – linear and planar densities – crystalline and noncrystalline materials –Example use of Miller indices: wafer surface orientation – wafer flats and notches – pattern alignment - imperfections in crystals.

UNIT II ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Quantum free electron theory :Tunneling – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole. Magnetic materials: Dia, para and ferromagnetic effects – paramagnetism in the conduction electrons in metals – exchange interaction and ferromagnetism – quantum interference devices – GMR devices.

UNIT III SEMICONDUCTORS AND TRANSPORT PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – Optical processes in semiconductors: optical absorption and

emission, charge injection and recombination, optical absorption, loss and gain. Optical processes in quantum wells – Optoelectronic devices: light detectors and solar cells – light emitting diode – laser diode - optical processes in organic semiconductor devices –excitonic state – Electro-optics and nonlinear optics: Modulators and switching devices – plasmonics.

UNIT V NANO DEVICES 9

Density of states for solids - Significance between Fermi energy and volume of the material – Quantum confinement – Quantum structures – Density of states for quantum wells, wires and dots – Band gap of nanomaterials –Tunneling – Single electron phenomena – Single electron Transistor. Conductivity of metallic nanowires – Ballistic transport – Quantum resistance and conductance – Carbon nanotubes: Properties and applications - Spintronic devices and applications – Optics in quantum structures – quantum well laser.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to

- know basics of crystallography and its importance for varied materials properties
- gain knowledge on the electrical and magnetic properties of materials and their applications
- understand clearly of semiconductor physics and functioning of semiconductor devices
- understand the optical properties of materials and working principles of various optical devices
- appreciate the importance of nanotechnology and nanodevices.

TEXT BOOKS:

1. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.
2. R.F.Pierret. Semiconductor Device Fundamentals. Pearson (Indian Edition), 2006.
3. G.W.Hanson. Fundamentals of Nanoelectronics. Pearson Education (Indian Edition), 2009.

REFERENCES:

1. Laszlo Solymar, Walsh, Donald, Syms and Richard R.A., Electrical Properties of Materials, Oxford Univ. Press (Indian Edition) 2015.
2. Jasprit Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Education (Indian Edition), 2019.
3. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
4. Mark Fox, Optical Properties of Solids, Oxford Univ.Press, 2001.
5. N.Gershenfeld. The Physics of Information Technology. Cambridge University Press, 2011.

BE3254 ELECTRICAL AND INSTRUMENTATION ENGINEERING L T P C

3 0 0 3

COURSE

OBJECTIVES :

- To impart knowledge in types, construction and working of transformers
- To impart knowledge in types, construction and working of DC machines
- To impart knowledge in types, construction and working of AC rotating machines
- To introduce the functional elements and working of measuring instruments.
- To introduce the basics of power system and protection schemes

UNIT I TRANSFORMER 9

Introduction - Ideal and Practical Transformer – Phasor diagram-– Per Unit System – Equivalent circuit- Testing- Efficiency and Voltage Regulation– Three Phase Transformers –Applications- Auto Transformers, Advantages- Harmonics.

UNIT II DC MACHINES 9

Introduction – Constructional Features– Motor and Generator mode - EMF and Torque equation – Circuit Model – Methods of Excitation- Characteristics – Starting and Speed Control – Universal Motor- Stepper Motors – Brushless DC Motors- Applications

UNIT III AC ROTATING MACHINES 9

Principle of operation of three-phase induction motors – Construction –Types – Equivalent circuit, Speed Control - Single phase Induction motors -Construction– Types–starting methods. Alternator: Working principle–Equation of induced EMF – Voltage regulation, Synchronous motors- working principle-starting methods – Torque equation.

UNIT IV MEASUREMENTS AND INSTRUMENTATION 9

Functional elements of an instrument , Standards and calibration, Operating Principle , types - Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT,DSO- Block diagram- Data acquisition.

UNIT V BASICS OF POWER SYSTEMS 9

Power system structure -Generation , Transmission and distribution , Various voltage levels, Earthing – methods of earthing, protective devices- switch fuse unit- Miniature circuit breaker- moulded case circuit breaker- earth leakage circuit breaker, safety precautions and First Aid

TOTAL: 45 PERIODS

COURSE OUTCOMES :

After completing this course, the students will be able to

CO1: Explain the working principle of electrical machines

CO2: Analyze the output characterizes of electrical machines

CO3: Choose the appropriate electrical machines for various applications
CO4: Explain the types and operating principles of measuring instruments
CO5: Explain the basic power system structure and protection schemes

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020
2. S. K, Bhattacharya, "Basic Electrical and Electronics Engineering", Second Edition, Pearson Education, 2017.
3. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, New Delhi, 2015.
4. C.L.Wadhwa, "Generation, Distribution and Utilisation of Electrical Energy", New Age International pvt.ltd.,2003

REFERENCES:

1. Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019
2. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
3. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

GE3251 ENGINEERING GRAPHICS **L T P C 2 0 4 4**

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

- Drawing engineering curves.
- Drawing freehand sketch of simple objects.
- Drawing orthographic projection of solids and section of solids.
- Drawing development of solids
- Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications — Use of drafting instruments — BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING 6+12

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection - principles - Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection

of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 6+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.

Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6 +12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.

Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12

Principles of isometric projection — isometric scale —lsometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

Practicing three dimensional modeling of isometric projection of simple objects by CAD Software

(Not for examination)

TOTAL: (L=30+P=60) 90 PERIODS

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

- Use BIS conventions and specifications for engineering drawing.
- Construct the conic curves, involutes and cycloid.
- Solve practical problems involving projection of lines.
- Draw the orthographic, isometric and perspective projections of simple solids.
- Draw the development of simple solids.

TEXT BOOKS:

1. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House,

rd
53 Edition, 2019.

2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai,2018.

3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

REFERENCES:

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
3. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition,
   2009.
6. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

Publication of Bureau of Indian Standards:

1. IS 10711 — 2001: Technical products Documentation — Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) — 2001: Technical products Documentation — Lettering.
3. IS 10714 (Part 20) — 2001 & SP 46 — 2003: Lines for technical drawings.
4. IS 11669 — 1986 & SP 46 —2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) — 2001: Technical drawings — Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

EC3251	CIRCUIT ANALYSIS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To learn the basic concepts and behaviour of DC and AC circuits.
- To understand various methods of circuit/ network analysis using network theorems.
- To understand the transient and steady state response of the circuits subjected to DC excitations and AC with sinusoidal excitations.
- To learn the concept of coupling in circuits and topologies.

UNIT I DC CIRCUIT ANALYSIS 12

Basic Components of electric Circuits, Charge, current, Voltage and Power, Voltage and Current Sources, Ohms Law, Kirchoff's Current Law, Kirchoff's voltage law, The single Node – Pair Circuit, series and Parallel Connected Independent Sources, Resistors in Series and Parallel, voltage and current division, Nodal analysis, Mesh analysis.

UNIT II NETWORK THEOREM AND DUALITY 12

Useful Circuit Analysis techniques - Linearity and superposition, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion. Duals, Dual circuits. Analysis using dependent current sources and voltage sources

UNIT III SINUSOIDAL STEADY STATE ANALYSIS 12

Sinusoidal Steady – State analysis , Characteristics of Sinusoids, The Complex Forcing Function, The Phasor, Phasor relationship for R, L, and C, impedance and Admittance, Nodal and Mesh Analysis, Phasor Diagrams, AC Circuit Power Analysis, Instantaneous Power, Average Power, apparent Power and Power Factor, Complex Power.

UNIT IV TRANSIENTS AND RESONANCE IN RLC CIRCUITS 12

Basic RL and RC Circuits, The Source- Free RL Circuit, The Source-Free RC Circuit, The Unit-Step Function, Driven RL Circuits, Driven RC Circuits, RLC Circuits, Frequency Response, Parallel Resonance, Series Resonance, Quality Factor.

UNIT V COUPLED CIRCUITS AND TOPOLOGY 12

Magnetically Coupled Circuits, mutual Inductance, the Linear Transformer, the Ideal Transformer, An introduction to Network Topology, Trees and General Nodal analysis, Links and Loop analysis.

SUGGESTED ACTIVITIES:

- Practice solving variety of problems

COURSE OUTCOMES

On successful completion of this course, the student will be able to

CO1: Apply the basic concepts of circuit analysis such as Kirchoff's laws, mesh current and node voltage method for analysis of DC and AC circuits.

CO2: Apply suitable network theorems and analyze AC and DC circuits

CO3: Analyze steady state response of any R, L and C circuits

CO4: Analyze the transient response for any RC, RL and RLC circuits and frequency response of parallel and series resonance circuits.

CO5: Analyze the coupled circuits and network topologies

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Hayt Jack Kemmerly, Steven Durbin, "Engineering Circuit Analysis",Mc Graw Hill education, 9th Edition, 2018.
2. Charles K. Alexander & Mathew N.O.Sadiku, "Fundamentals of Electric Circuits", Mc
Graw- Hill, 2nd Edition, 2003.
3. Joseph Edminister and Mahmood Nahvi, ―Electric Circuits, Schaum‘s Outline Series, Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition Reprint 2016.

REFERENCES:

1. Robert.L. Boylestead, "Introductory Circuit Analysis", Pearson Education India, 12th Edition, 2014. David Bell, "Fundamentals of Electric Circuits", Oxford University press,
7thEdition, 2009.
2. John O Mallay, Schaum’s Outlines "Basic Circuit Analysis", The Mc Graw Hill companies,
2nd Edition, 2011
3. Allan H.Robbins, Wilhelm C.Miller, ―Circuit Analysis Theory and Practice‖, Cengage
Learning, Fifth Edition, 1st Indian Reprint 2013

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING
REGULATIONS – 2017

PROGRAMME EDUCATIONAL OBJECTIVES:

PEO1: To enable graduates to pursue research, or have a successful career in academia or industries associated with Electronics and Communication Engineering, or as entrepreneurs.

PEO2: To provide students with strong foundational concepts and also advanced techniques and tools in order to enable them to build solutions or systems of varying complexity.

PEO3: To prepare students to critically analyze existing literature in an area of specialization and ethically develop innovative and research oriented methodologies to solve the problems identified.

PROGRAMME OUTCOMES:

Engineering Graduates will be able to:

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.

To apply design principles and best practices for developing quality products for scientific and business applications.

To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.

Contribution 1: Reasonable 2: Significant 3: Strong

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	A	B	C	D	E	F	G	H	I	J	K	L
1	3	3	2	3	2	1	1	2	1	1	3	1
2	3	3	3	3	3	1	1	1	1	1	1	2
3	3	3	3	3	3	2	2	3	1	2	2	2

MAPPING OF PROGRAM SPECIFIC OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Objectives and the outcomes is given in the following table

PROGRAM SPECIFIC OBJECTIVES	PROGRAMME OUTCOMES											
	A	B	C	D	E	F	G	H	I	J	K	L
1	3	3	2	3	2	1	1	1	1	1	1	2
2	3	3	3	3	3	2	2	3	1	3	3	3
3	3	3	3	3	3	3	3	2	1	1	1	3

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

A broad relation between the Course Outcomes and Programme Outcomes is given in the following table

COURSE OUTCOMES		PROGRAMME OUTCOMES											
Sem	**Course Name**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
I	Communicative English												
	Engineering Mathematics – I												
	Engineering Physics												
	Engineering Chemistry												
	Problem Solving and Python Programming												
	Engineering Graphics												
	Problem Solving and Python Programming Laboratory												
	Physics and Chemistry Laboratory												
II	Technical English												
	Engineering Mathematics – II												
	Physics for Electronics Engineering												
	Basic Electrical and Instrumentation Engineering												
	Circuit Analysis												
	Electronic Devices												
	Circuits and Devices Laboratory												
	Engineering Practices Laboratory												
III	Linear Algebra and Partial Differential Equations												
	Fundamentals of Data Structures In C												
	Electronic Circuits- I												
	Signals and Systems												
	Digital Electronics												
	Control System Engineering												
	Fundamentals of Data Structures in C Laboratory												
	Analog and Digital Circuits Laboratory												
	Interpersonal Skills/Listening &Speaking												
IV	Probability and Random Processes												
	Electronic Circuits II												
	Communication Theory												
	Electromagnetic Fields												
	Linear Integrated Circuits												
	Environmental Science and Engineering												

COURSE OUTCOMES		PROGRAMME OUTCOMES											
Sem	**Course Name**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
	Circuits Design and Simulation Laboratory												
	Linear Integrated Circuits Laboratory												
V	Digital Communication												
	Discrete-Time Signal Processing												
	Computer Architecture and Organization												
	Communication Networks												
	Professional Elective I												
	Open Elective I												
	Digital Signal Processing Laboratory												
	Communication Systems Laboratory												
	Networks Laboratory												
VI	Microprocessors and Microcontrollers												
	VLSI Design												
	Wireless Communication												
	Principles of Management												
	Transmission Lines and RF Systems												
	Professional Elective -II												
	Microprocessors and Microcontrollers Laboratory												
	VLSI Design Laboratory												
	Technical Seminar												
	Professional Communication												
VII	Antennas and Microwave Engineering												
	Optical Communication												
	Embedded and Real Time Systems												
	Ad hoc and Wireless Sensor Networks												
	Professional Elective -III												
	Open Elective - II												
	Embedded Laboratory												
	Advanced Communication Laboratory												
VIII	Professional Elective - IV												
	Professional Elective - V												
	Project Work												

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM
I - VIII SEMESTERS CURRICULA AND SYLLABI

SEMESTER I

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	MA8151	Engineering Mathematics - I	BS	4	4	0	0	4
3.	PH8151	Engineering Physics	BS	3	3	0	0	3
4.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
6.	GE8152	Engineering Graphics	ES	6	2	0	4	4
PRACTICALS								
7.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
8.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
			TOTAL	**31**	**19**	**0**	**12**	**25**

SEMESTER II

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8251	Technical English	HS	4	4	0	0	4
2.	MA8251	Engineering Mathematics - II	BS	4	4	0	0	4
3.	PH8253	Physics for Electronics Engineering	BS	3	3	0	0	3
4.	BE8254	Basic Electrical and Instrumentation Engineering	ES	3	3	0	0	3
5.	EC8251	Circuit Analysis	PC	4	4	0	0	4
6.	EC8252	Electronic Devices	PC	3	3	0	0	3
PRACTICALS								
7.	EC8261	Circuits and Devices Laboratory	PC	4	0	0	4	2
8.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
			TOTAL	**29**	**21**	**0**	**8**	**25**

SEMESTER III

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8352	Linear Algebra and Partial Differential Equations	BS	4	4	0	0	4
2.	EC8393	Fundamentals of Data Structures In C	ES	3	3	0	0	3
3.	EC8351	Electronic Circuits- I	PC	3	3	0	0	3
4.	EC8352	Signals and Systems	PC	4	4	0	0	4
5.	EC8392	Digital Electronics	PC	3	3	0	0	3
6.	EC8391	Control Systems Engineering	PC	3	3	0	0	3
PRACTICALS								
7.	EC8381	Fundamentals of Data Structures in C Laboratory	ES	4	0	0	4	2
8.	EC8361	Analog and Digital Circuits Laboratory	PC	4	0	0	4	2
9.	HS8381	Interpersonal Skills/Listening &Speaking	EEC	2	0	0	2	1
			TOTAL	**30**	**20**	**0**	**10**	**25**

SEMESTER IV

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8451	Probability and Random Processes	BS	4	4	0	0	4
2.	EC8452	Electronic Circuits II	PC	3	3	0	0	3
3.	EC8491	Communication Theory	PC	3	3	0	0	3
4.	EC8451	Electromagnetic Fields	PC	4	4	0	0	4
5.	EC8453	Linear Integrated Circuits	PC	3	3	0	0	3
6.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
PRACTICALS								
7.	EC8461	Circuits Design and Simulation Laboratory	PC	4	0	0	4	2
8.	EC8462	Linear Integrated Circuits Laboratory	PC	4	0	0	4	2
			TOTAL	**28**	**20**	**0**	**8**	**24**

SEMESTER V

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EC8501	Digital Communication	PC	3	3	0	0	3
2.	EC8553	Discrete-Time Signal Processing	PC	4	4	0	0	4
3.	EC8552	Computer Architecture and Organization	PC	3	3	0	0	3
4.	EC8551	Communication Networks	PC	3	3	0	0	3
5.		Professional Elective I	PE	3	3	0	0	3
6.		Open Elective I	OE	3	3	0	0	3
PRACTICALS								
7.	EC8562	Digital Signal Processing Laboratory	PC	4	0	0	4	2
8.	EC8561	Communication Systems Laboratory	PC	4	0	0	4	2
9.	EC8563	Communication Networks Laboratory	PC	4	0	0	4	2
			TOTAL	**31**	**19**	**0**	**12**	**25**

SEMESTER VI

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EC8691	Microprocessors and Microcontrollers	PC	3	3	0	0	3
2.	EC8095	VLSI Design	PC	3	3	0	0	3
3.	EC8652	Wireless Communication	PC	3	3	0	0	3
4.	MG8591	Principles of Management	HS	3	3	0	0	3
5.	EC8651	Transmission Lines and RF Systems	PC	3	3	0	0	3
6.		Professional Elective -II	PE	3	3	0	0	3
PRACTICALS								
7.	EC8681	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
8.	EC8661	VLSI Design Laboratory	PC	4	0	0	4	2
9.	EC8611	Technical Seminar	EEC	2	0	0	2	1
10.	HS8581	Professional Communication	EEC	2	0	0	2	1
			TOTAL	**30**	**18**	**0**	**12**	**24**

SEMESTER VII

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EC8701	Antennas and Microwave Engineering	PC	3	3	0	0	3
2.	EC8751	Optical Communication	PC	3	3	0	0	3
3.	EC8791	Embedded and Real Time Systems	PC	3	3	0	0	3
4.	EC8702	Ad hoc and Wireless Sensor Networks	PC	3	3	0	0	3
5.		Professional Elective -III	PE	3	3	0	0	3
6.		Open Elective - II	OE	3	3	0	0	3
PRACTICALS								
7.	EC8711	Embedded Laboratory	PC	4	0	0	4	2
8.	EC8761	Advanced Communication Laboratory	PC	4	0	0	4	2
			TOTAL	**26**	**18**	**0**	**8**	**22**

SEMESTER VIII

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Professional Elective IV	PE	3	3	0	0	3
2.		Professional Elective V	PE	3	3	0	0	3
PRACTICALS								
3.	EC8811	Project Work	EEC	20	0	0	20	10
			TOTAL	**26**	**6**	**0**	**20**	**16**

TOTAL NO. OF CREDITS: 186

HUMANITIES AND SOCIALSCIENCES (HS)

Sl.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	HS8251	Technical English	HS	4	4	0	0	4
3.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
4.	MG8591	Principles of Management	HS	3	3	0	0	3

BASIC SCIENCES (BS)

Sl.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA8151	Engineering Mathematics I	BS	4	4	0	0	4
2.	PH8151	Engineering Physics	BS	3	3	0	0	3
3.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
4.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
5.	MA8251	Engineering Mathematics II	BS	4	4	0	0	4
6.	PH8253	Physics for Electronics Engineering	BS	3	3	0	0	3
7.	MA8352	Linear Algebra and Partial Differential Equations	BS	4	4	0	0	4
8.	MA8451	Probability and Random Processes	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
2.	GE8152	Engineering Graphics	ES	6	2	0	4	4
3.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
4.	BE8254	Basic Electrical and Instrumentation Engineering	ES	3	3	0	0	3
5.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
6.	EC8393	Fundamentals of Data Structures In C	ES	3	3	0	0	3
7.	EC8381	Fundamentals of Data Structures in C Laboratory	ES	4	0	0	4	2

PROFESSIONAL CORE (PC)

SI.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EC8251	Circuit Analysis	PC	4	4	0	0	4
2.	EC8252	Electronic Devices	PC	3	3	0	0	3
3.	EC8261	Circuits and Devices Lab	PC	4	0	0	4	2
4.	EC8351	Electronic Circuits- I	PC	3	3	0	0	3
5.	EC8352	Signals and Systems	PC	4	4	0	0	4
6.	EC8392	Digital Electronics	PC	3	3	0	0	3
7.	EC8391	Control System Engineering	PC	3	3	0	0	3
8.	EC8361	Analog and Digital Circuits Laboratory	PC	4	0	0	4	2
9.	EC8452	Electronic Circuits II	PC	3	3	0	0	3
10.	EC8491	Communication Theory	PC	3	3	0	0	3
11.	EC8451	Electromagnetic Fields	PC	4	4	0	0	4
12.	EC8453	Linear Integrated Circuits	PC	3	3	0	0	3
13.	EC8461	Circuits Design and Simulation Laboratory	PC	4	0	0	4	2
14.	EC8462	Linear Integrated Circuits Laboratory	PC	4	0	0	4	2
15.	EC8501	Digital Communication	PC	3	3	0	0	3
16.	EC8553	Discrete-Time Signal Processing	PC	4	4	0	0	4
17.	EC8651	Transmission Lines and RF Systems	PC	3	3	0	0	3
18.	EC8552	Computer Architecture and Organization	PC	3	3	0	0	3
19.	EC8551	Communication Networks	PC	3	3	0	0	3
20.	EC8562	Digital Signal Processing Laboratory	PC	4	0	0	4	2
21.	EC8561	Communication Systems Laboratory	PC	4	0	0	4	2
22.	EC8563	Communication Networks Laboratory	PC	4	0	0	4	2
23.	EC8691	Microprocessors and Microcontrollers	PC	3	3	0	0	3
24.	EC8095	VLSI Design	PC	3	3	0	0	3
25.	EC8652	Wireless Communication	PC	3	3	0	0	3
26.	EC8661	VLSI Design Laboratory	PC	4	0	0	4	2

27.	EC8681	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
28.	EC8701	Antennas and Microwave Engineering	PC	3	3	0	0	3
29.	EC8751	Optical Communication	PC	3	3	0	0	3
30.	EC8791	Embedded and Real Time Systems	PC	3	3	0	0	3
31.	EC8702	Ad hoc and Wireless Sensor Networks	PC	3	3	0	0	3
32.	EC8711	Embedded Laboratory	PC	4	0	0	4	2
33.	EC8761	Advanced Communication Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE)*

SEMESTER V

ELECTIVE I

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8392	Object Oriented Programming	PE	3	3	0	0	3
2.	EC8073	Medical Electronics	PE	3	3	0	0	3
3.	CS8493	Operating Systems	PE	3	3	0	0	3
4.	EC8074	Robotics and Automation	PE	3	3	0	0	3
5.	EC8075	Nano Technology and Applications	PE	3	3	0	0	3
6.	GE8074	Human Rights	PE	3	3	0	0	3
7.	GE8077	Total Quality Management	PE	3	3	0	0	3

SEMESTER VI

ELECTIVE II

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8792	Cryptography and Network Security	PE	3	3	0	0	3
2.	EC8091	Advanced Digital Signal Processing	PE	3	3	0	0	3
3.	EC8001	MEMS and NEMS	PE	3	3	0	0	3
4.	EC8002	Multimedia Compression and Communication	PE	3	3	0	0	3
5.	EC8003	CMOS Analog IC Design	PE	3	3	0	0	3
6.	EC8004	Wireless Networks	PE	3	3	0	0	3
7.	GE8075	Intellectual Property Rights	PE	3	3	0	0	3

SEMESTER VII

ELECTIVE III

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EC8092	Advanced Wireless Communication	PE	3	3	0	0	3
2.	EC8071	Cognitive Radio	PE	3	3	0	0	3
3.	GE8072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3
4.	CS8082	Machine Learning Techniques	PE	3	3	0	0	3
5.	EC8005	Electronics Packaging and Testing	PE	3	3	0	0	3
6.	EC8006	Mixed Signal IC Design	PE	3	3	0	0	3
7.	GE8071	Disaster Management	PE	3	3	0	0	3

SEMESTER VIII
ELECTIVE IV

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EC8072	Electro Magnetic Interference and Compatibility	PE	3	3	0	0	3
2.	EC8007	Low power SoC Design	PE	3	3	0	0	3
3.	EC8008	Photonic Networks	PE	3	3	0	0	3
4.	EC8009	Compressive Sensing	PE	3	3	0	0	3
5.	EC8093	Digital Image Processing	PE	3	3	0	0	3
6.	GE8076	Professional Ethics in Engineering	PE	3	3	0	0	3

SEMESTER VIII
ELECTIVE V

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EC8010	Video Analytics	PE	3	3	0	0	3
2.	EC8011	DSP Architecture and Programming	PE	3	3	0	0	3
3.	EC8094	Satellite Communication	PE	3	3	0	0	3
4.	CS8086	Soft Computing	PE	3	3	0	0	3
5.	IT8006	Principles of Speech Processing	PE	3	3	0	0	3
6.	GE8073	Fundamentals of Nanoscience	PE	3	3	0	0	3

***Professional Electives are grouped according to elective number as was done previously.**

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8381	Interpersonal Skills/Listening & Speaking	EEC	2	0	0	2	1
2.	EC8611	Technical Seminar	EEC	2	0	0	2	1
3.	HS8581	Professional Communication	EEC	2	0	0	2	1
4.	EC8811	Project Work	EEC	20	0	0	20	10

SUMMARY

S.NO.	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL	Percentage
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	4	4		3		3			14	7.56%
2.	BS	12	7	4	4					27	14.6%
3.	ES	9	5	5						19	10.27%
4.	PC		9	15	17	19	16	16		92	50%
5.	PE					3	3	3	6	15	8.10%
6.	OE					3		3		6	3.24%
7.	EEC			1			2		10	13	6.48%
	Total	25	25	25	24	25	24	22	16	186	
8.	Non Credit / Mandatory										

HS8151	COMMUNICATIVE ENGLISH	L	T	P	C
		4	0	0	4

OBJECTIVES:

To develop the basic reading and writing skills of first year engineering and technology students.

To help learners develop their listening skills, which will, enable them listen to lectures and comprehend them by asking questions; seeking clarifications.

To help learners develop their speaking skills and speak fluently in real contexts.

To help learners develop vocabulary of a general kind by developing their reading skills

UNIT I SHARING INFORMATION RELATED TO ONESELF/FAMILY& FRIENDS 12

Reading- short comprehension passages, practice in skimming-scanning and predicting- **Writing**- completing sentences- - developing hints. **Listening**- short texts- short formal and informal conversations. **Speaking-** introducing oneself - exchanging personal information- **Language development**- Wh- Questions- asking and answering-yes or no questions- parts of speech. **Vocabulary development-**- prefixes- suffixes- articles.- count/ uncount nouns.

UNIT II GENERAL READING AND FREE WRITING 12

Reading - comprehension-pre-reading-post reading- comprehension questions (multiple choice questions and /or short questions/ open-ended questions)-inductive reading- short narratives and descriptions from newspapers including dialogues and conversations (also used as short Listening texts)- register- **Writing** – paragraph writing- topic sentence- main ideas- free writing, short narrative descriptions using some suggested vocabulary and structures –**Listening**- telephonic conversations. **Speaking –** sharing information of a personal kind—greeting – taking leave- **Language development** – prepositions, conjunctions **Vocabulary development-** guessing meanings of words in context.

UNIT III GRAMMAR AND LANGUAGE DEVELOPMENT 12

Reading- short texts and longer passages (close reading) **Writing-** understanding text structure- use of reference words and discourse markers-coherence-jumbled sentences **Listening** – listening to longer texts and filling up the table- product description- narratives from different sources. **Speaking**- asking about routine actions and expressing opinions. **Language development**- degrees of comparison- pronouns- direct vs indirect questions- **Vocabulary development –** single word substitutes- adverbs.

UNIT IV READING AND LANGUAGE DEVELOPMENT 12

Reading- comprehension-reading longer texts- reading different types of texts- magazines **Writing**- letter writing, informal or personal letters-e-mails-conventions of personal email- **Listening**- listening to dialogues or conversations and completing exercises based on them. **Speaking-** speaking about oneself- speaking about one's friend- **Language development-** Tenses- simple present-simple past- present continuous and past continuous- **Vocabulary development**- synonyms-antonyms- phrasal verbs

UNIT V EXTENDED WRITING 12

Reading- longer texts- close reading –**Writing**- brainstorming -writing short essays **–** developing an outline- identifying main and subordinate ideas- dialogue writing-**Listening** – listening to talks-conversations- **Speaking –** participating in conversations- short group conversations-**Language development**-modal verbs- present/ past perfect tense - **Vocabulary development**-collocations-fixed and semi-fixed expressions.

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, learners will be able to:

Read articles of a general kind in magazines and newspapers.

Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.

Comprehend conversations and short talks delivered in English

Write short essays of a general kind and personal letters and emails in English.

TEXT BOOKS:

Board of Editors. **Using English** A Coursebook for Undergarduate Engineers and Technologists**.** Orient BlackSwan Limited, Hyderabad: 2015

Richards, C. Jack. **Interchange Students' Book-2** New Delhi: CUP, 2015.

REFERENCES:

Bailey, Stephen. **Academic Writing: A practical guide for students**. New York: Rutledge,2011.

Means,L. Thomas and Elaine Langlois. **English & Communication For Colleges.** CengageLearning ,USA: 2007

Redston, Chris &Gillies Cunningham **Face2Face** (Pre-intermediate Student's Book& Workbook) Cambridge University Press, New Delhi: 2005

Comfort, Jeremy, et al. **Speaking Effectively: Developing Speaking Skills for Business English.** Cambridge University Press, Cambridge: Reprint 2011

Dutt P. Kiranmai and Rajeevan Geeta. **Basic Communication Skills,** Foundation Books: 2013.

MA8151 **ENGINEERING MATHEMATICS – I** **L T P C**
4 0 0 4

OBJECTIVES :

The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT I DIFFERENTIAL CALCULUS 12

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT III INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

UNIT V DIFFERENTIAL EQUATIONS 12

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients - Method of undetermined coefficients.

TOTAL : 60 PERIODS

OUTCOMES:

After completing this course, students should demonstrate competency in the following skills:

Use both the limit definition and rules of differentiation to differentiate functions. Apply differentiation to solve maxima and minima problems.

Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.

Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.

Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.

Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.

Apply various techniques in solving differential equations.

TEXT BOOKS :

Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.

James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015. [For Units I & III - Sections 1.1, 2.2, 2.3, 2.5, 2.7(Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1(Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :

Anton, H, Bivens, I and Davis, S, "Calculus", Wiley, 10th Edition, 2016.

Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 3rd Edition, 2007.

3. Narayanan, S. and Manicavachagom Pillai, T. K., “Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.

Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.

Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016.

		L	T	P	C
PH8151	**ENGINEERING PHYSICS**	**3**	**0**	**0**	**3**

OBJECTIVES:

To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I PROPERTIES OF MATTER 9

Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT II WAVES AND FIBER OPTICS 9

Oscillatory motion – forced and damped oscillations: differential equation and its solution – plane progressive waves – wave equation. Lasers : population of energy levels, Einstein’s A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – losses associated with optical fibers - fibre optic sensors: pressure and displacement.

UNIT III THERMAL PHYSICS 9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conduction, convection and radiation – heat conductions in solids – thermal conductivity - Forbe’s and Lee’s disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT IV QUANTUM PHYSICS 9

Black body radiation – Planck’s theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger’s wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunnelling (qualitative) - scanning tunnelling microscope.

UNIT V CRYSTAL PHYSICS 9

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults – role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course,

the students will gain knowledge on the basics of properties of matter and its applications,

the students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,

the students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,

the students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and

the students will understand the basics of crystals, their structures and different crystal growth techniques.

TEXT BOOKS:

Bhattacharya, D.K. & Poonam, T. “Engineering Physics”. Oxford University Press, 2015.

Gaur, R.K. & Gupta, S.L. “Engineering Physics”. Dhanpat Rai Publishers, 2012.

Pandey, B.K. & Chaturvedi, S. “Engineering Physics”. Cengage Learning India, 2012.

REFERENCES:

Halliday, D., Resnick, R. & Walker, J. “Principles of Physics”. Wiley, 2015.

Serway, R.A. & Jewett, J.W. “Physics for Scientists and Engineers”. Cengage Learning, 2010.

Tipler, P.A. & Mosca, G. “Physics for Scientists and Engineers with Modern Physics’. W.H.Freeman, 2007.

CY8151 ENGINEERING CHEMISTRY L T P C

3 0 0 3

OBJECTIVES:

To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.

To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.

Preparation, properties and applications of engineering materials.

Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT I WATER AND ITS TREATMENT 9

Hardness of water – types – expression of hardness – units – estimation of hardness of water by EDTA – numerical problems – boiler troubles (scale and sludge) – treatment of boiler feed water – Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) external treatment – Ion exchange process, zeolite process – desalination of brackish water - Reverse Osmosis.

UNIT II SURFACE CHEMISTRY AND CATALYSIS 9

Adsorption: Types of adsorption – adsorption of gases on solids – adsorption of solute from solutions – adsorption isotherms – Freundlich's adsorption isotherm – Langmuir's adsorption isotherm – contact theory – kinetics of surface reactions, unimolecular reactions, Langmuir - applications of adsorption on pollution abatement. Catalysis: Catalyst – types of catalysis – criteria – autocatalysis – catalytic poisoning and catalytic promoters - acid base catalysis – applications (catalytic convertor) – enzyme catalysis– Michaelis – Menten equation.

UNIT III ALLOYS AND PHASE RULE 9

Alloys: Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Nichrome and stainless steel (18/8) – heat treatment of steel. Phase rule: Introduction, definition of terms with examples, one component system -water system - reduced phase rule - thermal analysis and cooling curves - two component systems - lead-silver system - Pattinson process.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - manufacture of synthetic petrol (Bergius process) - knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - power alcohol and biodiesel. Combustion of fuels: Introduction - calorific value - higher and lower calorific values- theoretical calculation of calorific value - ignition temperature - spontaneous ignition temperature - explosive range - flue gas analysis (ORSAT Method).

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant - breeder reactor - solar energy conversion - solar cells - wind energy. Batteries, fuel cells and supercapacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells – H_2-O_2 fuel cell.

TOTAL: 45 PERIODS

OUTCOMES:

The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015

P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015

S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD, New Delhi, 2013.

REFERENCES:

Friedrich Emich, “Engineering Chemistry”, Scientific International PVT, LTD, New Delhi, 2014.
Prasanta Rath, “Engineering Chemistry”, Cengage Learning India PVT, LTD, Delhi, 2015.
Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, 2015.

GE8151 PROBLEM SOLVING AND PYTHON PROGRAMMING LTPC 3003

OBJECTIVES:

To know the basics of algorithmic problem solving
To read and write simple Python programs.
To develop Python programs with conditionals and loops.
To define Python functions and call them.
To use Python data structures –- lists, tuples, dictionaries.
To do input/output with files in Python.

UNIT I ALGORITHMIC PROBLEM SOLVING 9

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

Develop algorithmic solutions to simple computational problems
Read, write, execute by hand simple Python programs.

Structure simple Python programs for solving problems.
Decompose a Python program into functions.

Represent compound data using Python lists, tuples, dictionaries.
Read and write data from/to files in Python Programs.

TEXT BOOKS:

Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013

Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.

Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.

Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.

Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.

Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC, 2013.

GE8152 ENGINEERING GRAPHICS L T P C
2 0 4 4

OBJECTIVES:

To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.

T o expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination) 1

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING 7+12

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 5+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 5+12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method .

TOTAL: 90 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to:

Familiarize with the fundamentals and standards of Engineering graphics

Perform freehand sketching of basic geometrical constructions and multiple views of objects.

Project orthographic projections of lines and plane surfaces.

Draw projections and solids and development of surfaces.

Visualize and to project isometric and perspective sections of simple solids.

TEXT BOOKS:

Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.

Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2008.

REFERENCES:

Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.

Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2007.

Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

N S Parthasarathy And Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.

Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.

Publication of Bureau of Indian Standards:

IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.

IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.

IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

There will be five questions, each of either or type covering all units of the syllabus.
All questions will carry equal marks of 20 each making a total of 100.
The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
The examination will be conducted in appropriate sessions on the same day

GE8161 PROBLEM SOLVING ANDPYTHON PROGRAMMING LABORATORY **LTPC 0042**

OBJECTIVES

To write, test, and debug simple Python programs.

To implement Python programs with conditionals and loops. Use functions for structuring Python programs.

Represent compound data using Python lists, tuples, dictionaries. Read and write data from/to files in Python.

LIST OF PROGRAMS

Compute the GCD of two numbers.
Find the square root of a number (Newton's method)
Exponentiation (power of a number)
Find the maximum of a list of numbers
Linear search and Binary search
Selection sort, Insertion sort
Merge sort
First n prime numbers
Multiply matrices
Programs that take command line arguments (word count)
Find the most frequent words in a text read from a file
Simulate elliptical orbits in Pygame
Simulate bouncing ball using Pygame

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

OUTCOMES

Upon completion of the course, students will be able to:

Write, test, and debug simple Python programs.

Implement Python programs with conditionals and loops.

Develop Python programs step-wise by defining functions and calling them.
Use Python lists, tuples, dictionaries for representing compound data.

Read and write data from/to files in Python.

TOTAL: 60 PERIODS

BS8161 PHYSICS AND CHEMISTRY LABORATORY L T P C
(Common to all branches of B.E. / B.Tech Programmes) 0 0 4 2

OBJECTIVES:

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

Determination of rigidity modulus – Torsion pendulum

Determination of Young's modulus by non-uniform bending method

(a) Determination of wavelength, and particle size using Laser

(b) Determination of acceptance angle in an optical fiber.

Determination of thermal conductivity of a bad conductor – Lee's Disc method.

Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer

Determination of wavelength of mercury spectrum – spectrometer grating

Determination of band gap of a semiconductor

Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

apply principles of elasticity, optics and thermal properties for engineering applications.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:

To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

To acquaint the students with the determination of molecular weight of a polymer by viscometery.

Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.

Determination of total, temporary & permanent hardness of water by EDTA method.

Determination of DO content of water sample by Winkler's method.

Determination of chloride content of water sample by argentometric method.

Estimation of copper content of the given solution by Iodometry.

Determination of strength of given hydrochloric acid using pH meter.

Determination of strength of acids in a mixture of acids using conductivity meter.

Estimation of iron content of the given solution using potentiometer.

Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).

Estimation of sodium and potassium present in water using flame photometer.

Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

Pseudo first order kinetics-ester hydrolysis.

Corrosion experiment-weight loss method.

Determination of CMC.

Phase change in a solid.

Conductometric titration of strong acid vs strong base.

OUTCOMES:

The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

TOTAL: 30 PERIODS

TEXTBOOKS:

Vogel's Textbook of Quantitative Chemical Analysis (8^{TH} edition, 2014)

HS8251	TECHNICAL ENGLISH	L	T	P	C
		4	0	0	4

OBJECTIVES:

The Course prepares second semester engineering and Technology students to:

Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.

Foster their ability to write convincing job applications and effective reports.

Develop their speaking skills to make technical presentations, participate in group discussions.

Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialization.

UNIT I INTRODUCTION TECHNICAL ENGLISH 12

Listening- Listening to talks mostly of a scientific/technical nature and completing information-gap exercises- **Speaking** –Asking for and giving directions- **Reading** – reading short technical texts from journals- newsapapers- **Writing**- purpose statements – extended definitions – issue- writing instructions – checklists-recommendations-**Vocabulary Development**- technical vocabulary **Language Development** –subject verb agreement - compound words.

UNIT II READING AND STUDY SKILLS 12

Listening- Listening to longer technical talks and completing exercises based on them-**Speaking** – describing a process-**Reading** – reading longer technical texts- identifying the various transitions in a text- paragraphing- **Writing**- interpreting cgarts, graphs- **Vocabulary Development-** vocabularyused in formal letters/emails and reports **Language Development-** impersonal passive voice, numerical adjectives.

UNIT III TECHNICAL WRITING AND GRAMMAR 12

Listening- Listening to classroom lectures/ talkls on engineering/technology -**Speaking** – introduction to technical presentations- **Reading** – longer texts both general and technical, practice in speed reading; **Writing**-Describing a process, use of sequence words- **Vocabulary Development-** sequence words- Misspelled words. **Language Development-** embedded sentences

UNIT IV REPORT WRITING 12

Listening- Listening to documentaries and making notes. **Speaking** – mechanics of presentations- **Reading** – reading for detailed comprehension- **Writing**- email etiquette- job application – cover letter –Résumé preparation(via email and hard copy)- analytical essays and issue based essays--**Vocabulary Development**- finding suitable synonyms-paraphrasing-. **Language Development-** clauses- if conditionals.

UNIT V GROUP DISCUSSION AND JOB APPLICATIONS 12

Listening- TED/Ink talks; **Speaking** –participating in a group discussion -**Reading**– reading and understanding technical articles **Writing**– Writing reports- minutes of a meeting- accident and survey-**Vocabulary Development- verbal analogies Language Development-** reported speech

TOTAL :60 PERIODS

OUTCOMES:

At the end of the course learners will be able to:

Read technical texts and write area- specific texts effortlessly.

Listen and comprehend lectures and talks in their area of specialisation successfully.

Speak appropriately and effectively in varied formal and informal contexts.

Write reports and winning job applications.

TEXT BOOKS:

Board of editors. **Fluency in English A Course book for Engineering and Technology.** Orient Blackswan, Hyderabad: 2016

Sudharshana.N.P and Saveetha. C. **English for Technical Communication**. Cambridge University Press: New Delhi, 2016.

REFERENCES:

Raman, Meenakshi and Sharma, Sangeetha- **Technical Communication Principles and Practice.**Oxford University Press: New Delhi,2014.

Kumar, Suresh. E. **Engineering English**. Orient Blackswan: Hyderabad,2015

Booth-L. Diana**, Project Work,** Oxford University Press**,** Oxford: 2014.

Grussendorf, Marion, **English for Presentations,** Oxford University Press, Oxford: 2007

Means, L. Thomas and Elaine Langlois, **English & Communication For Colleges.** Cengage Learning, USA: 2007

Students can be asked to read Tagore, Chetan Bhagat and for supplementary reading.

MA8251 ENGINEERING MATHEMATICS – II

L	T	P	C
4	0	0	4

OBJECTIVES :

This course is designed to cover topics such as Matrix Algebra, Vector Calculus, Complex Analysis and Laplace Transform. Matrix Algebra is one of the powerful tools to handle practical problems arising in the field of engineering. Vector calculus can be widely used for modelling the various laws of physics. The various methods of complex analysis and Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT I MATRICES **12**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II VECTOR CALCULUS **12**

Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTIONS **12**

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $w = z + c$, cz, $\frac{1}{z}$, z^2 - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION **12**

Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour.

UNIT V LAPLACE TRANSFORMS 12

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

TOTAL: 60 PERIODS

OUTCOMES:

After successfully completing the course, the student will have a good understanding of the following topics and their applications:

Eigenvalues and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.

Gradient, divergence and curl of a vector point function and related identities.

Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.

Analytic functions, conformal mapping and complex integration.

Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

TEXT BOOKS :

Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2016.

REFERENCES :

Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.

Jain R.K. and Iyengar S.R.K., " Advanced Engineering Mathematics ", Narosa Publications, New Delhi , 3rd Edition, 2007.

3. O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.
4. Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.

Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

PH8253	PHYSICS FOR ELECTRONICS ENGINEERING	L	T	P	C
	(Common to BME, ME, CC, ECE, EEE, E&I, ICE)	3	0	0	3

OBJECTIVES:

To understand the essential principles of Physics of semiconductor device and Electron transport properties. Become proficient in magnetic, dielectric and optical properties of materials and nano devices.

UNIT I ELECTRICAL PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - electrons in metals – Particle in a three dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential: Bloch thorem – metals and insulators - Energy bands in solids– tight binding approximation - Electron effective mass – concept of hole.

UNIT II SEMICONDUCTOR PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Carrier transport: Velocity-electric field relations – drift and diffusion transport - Einstein's relation – Hall effect and devices – Zener and avalanche breakdown in p-n junctions - Ohmic contacts – tunnel diode - Schottky diode – MOS capacitor - power transistor.

UNIT III MAGNETIC AND DIELECTRIC PROPERTIES OF MATERIALS 9

Magnetism in materials – magnetic field and induction – magnetization - magnetic permeability and susceptibility–types of magnetic materials – microscopic classification of magnetic materials - Ferromagnetism: origin and exchange interaction- saturation magnetization and Curie temperature – Domain Theory. Dielectric materials: Polarization processes – dielectric loss – internal field – Clausius-Mosotti relation- dielectric breakdown – high-k dielectrics.

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and Semiconductors (concepts only) - photo current in a P- N diode – solar cell –photo detectors - LED – Organic LED – Laser diodes – excitons - quantum confined Stark effect – quantum dot laser.

UNIT V NANOELECTRONIC DEVICES 9

Introduction - electron density in bulk material – Size dependence of Fermi energy– quantum confinement – quantum structures - Density of states in quantum well, quantum wire and quantum dot structures –Zener-Bloch oscillations – resonant tunneling – quantum interference effects – mesoscopic structures: conductance fluctuations and coherent transport – Coulomb blockade effects - Single electron phenomena and Single electron Transistor – magnetic semiconductors– spintronics - Carbon nanotubes: Properties and applications.

TOTAL :45 PERIODS

OUTCOMES:

At the end of the course, the students will able to

Gain knowledge on classical and quantum electron theories, and energy band structuues,

Acquire knowledge on basics of semiconductor physics and its applications in various devices,

Get knowledge on magnetic and dielectric properties of materials,

Have the necessary understanding on the functioning of optical materials for optoelectronics,

Understand the basics of quantum structures and their applications in spintronics and carbon electronics..

TEXT BOOKS:

Kasap, S.O. "Principles of Electronic Materials and Devices", McGraw-Hill Education, 2007.

Umesh K Mishra & Jasprit Singh, "Semiconductor Device Physics and Design", Springer, 2008.

Wahab, M.A. "Solid State Physics: Structure and Properties of Materials". Narosa Publishing House, 2009.

REFERENCES:

Garcia, N. & Damask, A. "Physics for Computer Science Students". Springer-Verlag, 2012.

Hanson, G.W. "Fundamentals of Nanoelectronics". Pearson Education, 2009

Rogers, B., Adams, J. & Pennathur, S. "Nanotechnology: Understanding Small Systems". CRC Press, 2014

BE8254 BASIC ELECTRICAL AND INSTRUMENTATION ENGINEERING LTPC
30 03

OBJECTIVES:

To impart knowledge on

Operation of Three phase electrical circuits and power measurement
Working principles of Electrical Machines
Working principle of Various measuring instruments

UNIT I AC CIRCUITS AND POWER SYSTEMS 9

Three phase power supply – Star connection – Delta connection – Balanced and Unbalanced Loads- Power equation – Star Delta Conversion – Three Phase Power Measurement - Transmission & Distribution of electrical energy – Over head Vs Underground system – Protection of power system – types of tariff – power factor improvement

UNIT II TRANSFORMER 9

Introduction - Ideal Transformer – Accounting For Finite Permeability And Core Loss – Circuit Model Of Transformer – Per Unit System – Determination Of Parameters Of Circuit Model Of Transformer – Voltage Regulation – Name Plate Rating – Efficiency – Three Phase Transformers - Auto Transformers

UNIT III DC MACHINES 9

Introduction – Constructional Features– Motoring and generation principle - Emf And Torque equation – Circuit Model – Methods of Excitation and magnetisation characteristics – Starting and Speed Control – Universal Motor

UNIT IV AC MACHINES 9

Principle of operation of three-phase induction motors – Construction –Types – Equivalent circuit, Single phase Induction motors -Construction– Types–starting and speed control methods. Alternator- working principle–Equation of induced EMF – Voltage regulation, Synchronous motors-working principle-starting methods -– Torque equation – Stepper Motors – Brushless DC Motors

UNIT V MEASUREMENT AND INSTRUMENTATION 9

Type of Electrical and electronic instruments – Classification- Types of indicating Instruments – Principles of Electrical Instruments –Multimeters, Oscilloscopes- Static and Dynamic Characteristics of Measurement – Errors in Measurement – Transducers - Classification of Transducers: Resistive, Inductive, Capacitive, Thermoelectric, piezoelectric, photoelectric, Hall effect and Mechanical

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the students will be able to

Understand the concept of three phase power circuits and measurement.
Comprehend the concepts in electrical generators, motors and transformers
Choose appropriate measuring instruments for given application

TEXT BOOKS:

D P Kothari and I.J Nagarath, “Basic Electrical and Electronics Engineering”, McGraw Hill Education(India) Private Limited, Third Reprint ,2016

Giorgio Rizzoni, “Principles and Applications of Electrical Engineering”, McGraw Hill Education(India) Private Limited, 2010

S.K.Bhattacharya “Basic Electrical and Electronics Engineering”, Pearson India, 2011

REFERENCES:

Del Toro ,”Electrical Engineering Fundamentals”, Pearson Education, New Delhi, 2015.

Leonard S Bobrow, “ Foundations of Electrical Engineering”, Oxford University Press, 2013

3. Rajendra Prasad ,”Fundamentals of Electrical engineering”, Prentice Hall of India, 2006.

Mittle N., “Basic Electrical Engineering”, Tata McGraw Hill Edition, 24th reprint 2016

A.E.Fitzgerald, David E Higginbotham and Arvin Grabel, “Basic Electrical Engineering”, McGraw Hill Education(India) Private Limited, 2009

EC8251 CIRCUIT ANALYSIS LTPC
400 4

OBJECTIVES:

To introduce the basic concepts of DC and AC circuits behavior

To study the transient and steady state response of the circuits subjected to step and sinusoidal excitations.

To introduce different methods of circuit analysis using Network theorems, duality and topology.

UNIT I BASIC CIRCUITS ANALYSIS AND NETWORK TOPOLOGY 12

Ohm's Law – Kirchhoff's laws – Mesh current and node voltage method of analysis for D.C and A.C. circuits - Network terminology - Graph of a network - Incidence and reduced incidence matrices – Trees –Cutsets - Fundamental cutsets - Cutset matrix – Tie sets - Link currents and Tie set schedules -Twig voltages and Cutset schedules, Duality and dual networks.

UNIT II NETWORK THEOREMS FOR DC AND AC CIRCUITS 12

Network theorems -Superposition theorem, Thevenin's theorem, Norton'stheorem, Reciprocity theorem, Millman's theorem, and Maximum power transfer theorem ,application of Network theorems- Network reduction: voltage and current division, source transformation – star delta conversion.

UNIT III RESONANCE AND COUPLED CIRCUITS 12

Resonance - Series resonance - Parallel resonance - Variation of impedance with frequency - Variation in current through and voltage across L and C with frequency – Bandwidth - Q factor - Selectivity. Self inductance - Mutual inductance - Dot rule - Coefficient of coupling - Analysis of multiwinding coupled circuits - Series, Parallel connection of coupled inductors - Single tuned and double tuned coupled circuits.

UNITIV TRANSIENT ANALYSIS 12

Natural response-Forced response - Transient response of RC, RL and RLC circuits to excitation by Step Signal, Impulse Signal and exponential sources - Complete response of RC, RL and RLC Circuits to sinusoidal excitation.

UNIT V TWO PORT NETWORKS 12

Two port networks, Z parameters, Y parameters, Transmission (ABCD) parameters, Hybrid(H) **Parameters, Interconnection of two port networks, Symmetrical properties of T and π networks.**

TOTAL : 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Develop the capacity to analyze electrical circuits, apply the circuit theorems in real time

Design and understand and evaluate the AC and DC circuits.

TEXT BOOKS:

William H. Hayt, Jr. Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis" , McGraw Hill Science Engineering, Eighth Edition, 11th Reprint 2016.

Joseph Edminister and Mahmood Nahvi, "Electric Circuits", Schaum's Outline Series, Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition Reprint 2016.

REFERENCES:

Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Fifth Edition,
McGraw Hill, 9th Reprint 2015.

A.Bruce Carlson, "Cicuits: Engineering Concepts and Analysis of Linear Electric Circuits", Cengage Learning, India Edition 2nd Indian Reprint 2009.

Allan H.Robbins, Wilhelm C.Miller, "Circuit Analysis Theory and Practice", Cengage Learning, Fifth Edition, 1st Indian Reprint 2013.

EC8252 **ELECTRONIC DEVICES** **L T P C**
3 0 0 3

OBJECTIVES:

To acquaint the students with the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices

UNIT I SEMICONDUCTOR DIODE 9

PN junction diode, Current equations, Energy Band diagram, Diffusion and drift current densities, forward and reverse bias characteristics, Transition and Diffusion Capacitances, Switching Characteristics, Breakdown in PN Junction Diodes.

UNIT II BIPOLAR JUNCTION TRANSISTORS 9

NPN -PNP -Operations-Early effect-Current equations – Input and Output characteristics of CE, CB, CC - Hybrid -**π model** - h-parameter model, Ebers Moll Model- Gummel Poon-model, Multi Emitter Transistor.

UNIT III FIELD EFFECT TRANSISTORS 9

JFETs – Drain and Transfer characteristics,-Current equations-Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage -Channel length modulation, D-MOSFET, E-MOSFET- Characteristics – Comparison of MOSFET with JFET.

UNIT IV SPECIAL SEMICONDUCTOR DEVICES 9

Metal-Semiconductor Junction- MESFET, FINFET, PINFET, CNTFET, DUAL GATE MOSFET, Schottky barrier diode-Zener diode-Varactor diode –Tunnel diode- Gallium Arsenide device, LASER diode, LDR.

UNIT V POWER DEVICES AND DISPLAY DEVICES 9

UJT, SCR, Diac, Triac, Power BJT- Power MOSFET- DMOS-VMOS. LED, LCD, Photo transistor, Opto Coupler, Solar cell, CCD.

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course the students will be able to:

Explain the V-I characteristic of diode, UJT and SCR Describe the equivalence circuits of transistors

Operate the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices

TEXT BOOKS:

Donald A Neaman, “Semiconductor Physics and Devices”, Fourth Edition, Tata Mc GrawHill Inc. 2012.

Salivahanan. S, Suresh Kumar. N, Vallavaraj.A, “Electronic Devices and circuits”, Third Edition, Tata McGraw- Hill, 2008.

REFERENCES:

Robert Boylestad and Louis Nashelsky, “Electron Devices and Circuit Theory” Pearson Prentice Hall, 10th edition, July 2008.

R.S.Sedha, “ A Text Book of Applied Electronics” S.Chand Publications, 2006.

3. Yang, “Fundamentals of Semiconductor devices”, McGraw Hill International Edition, 1978.

EC8261 CIRCUITS AND DEVICES LABORATORY LTPC
0 0 4 2

OBJECTIVES:

To learn the characteristics of basic electronic devices such as Diode, BJT,FET, SCR To understand the working of RL,RC and RLC circuits

To gain hand on experience in Thevinin & Norton theorem, KVL & KCL, and Super Position Theorems

Characteristics of PN Junction Diode
Zener diode Characteristics & Regulator using Zener diode
Common Emitter input-output Characteristics
Common Base input-output Characteristics
FET Characteristics
SCR Characteristics
Clipper and Clamper & FWR
Verifications Of Thevinin & Norton theorem
Verifications Of KVL & KCL
Verifications Of Super Position Theorem
verifications of maximum power transfer & reciprocity theorem
Determination Of Resonance Frequency of Series & Parallel RLC Circuits
Transient analysis of RL and RC circuits

LABORATORY REQUIREMENTS

BC 107, BC 148,2N2646,BFW10	- 25 each
1N4007, Zener diodes	- 25 each
Resistors, Capacitors, Inductors	- sufficient quantities
Bread Boards	- 15 Nos
CRO (30MHz)	– 15 Nos.
Function Generators (3MHz)	– 10 Nos.
Dual Regulated Power Supplies (0 – 30V)	– 10 Nos.

TOTAL : 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Analyze the characteristics of basic electronic devices Design RL and RC circuits

Verify Thevinin & Norton theorem KVL & KCL, and Super Position Theorems

GE8261 ENGINEERING PRACTICES LABORATORY LTPC
0042

OBJECTIVES:

To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE 13

Buildings:

Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

Study of pipe connections requirements for pumps and turbines.

Preparation of plumbing line sketches for water supply and sewage works.

Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

Study of the joints in roofs, doors, windows and furniture.

Hands-on-exercise:

Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE 18

Welding:

(a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.

(b) Gas welding practice

Basic Machining:

Simple Turning and Taper turning

Drilling Practice

Sheet Metal Work:

Forming & Bending:

Model making – Trays and funnels.

Different type of joints.

Machine assembly practice:

Study of centrifugal pump

Study of air conditioner

Demonstration on:

Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.

Foundry operations like mould preparation for gear and step cone pulley.

Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 13

Residential house wiring using switches, fuse, indicator, lamp and energy meter.

Fluorescent lamp wiring.

Stair case wiring

Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.

Measurement of energy using single phase energy meter.

Measurement of resistance to earth of an electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE 16

Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.

Study of logic gates AND, OR, EX-OR and NOT.
Generation of Clock Signal.
Soldering practice – Components Devices and Circuits – Using general purpose PCB.

Measurement of ripple factor of HWR and FWR.

TOTAL: 60 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

Fabricate carpentry components and pipe connections including plumbing works.
Use welding equipments to join the structures.

Carry out the basic machining operations
Make the models using sheet metal works

Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings

Carry out basic home electrical works and appliances
Measure the electrical quantities

Elaborate on the components, gates, soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	15 Sets.
2. Carpentry vice (fitted to work bench)	15 Nos.
3. Standard woodworking tools	15 Sets.
4. Models of industrial trusses, door joints, furniture joints	5 each
5. Power Tools: (a) Rotary Hammer	2 Nos
(b) Demolition Hammer	2 Nos
(c) Circular Saw	2 Nos
(d) Planer	2 Nos
(e) Hand Drilling Machine	2 Nos
(f) Jigsaw	2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders	5 Nos.
2. Welding booth with exhaust facility	5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos.
5. Centre lathe	2 Nos.
6. Hearth furnace, anvil and smithy tools	2 Sets.
7. Moulding table, foundry tools	2 Sets.
8. Power Tool: Angle Grinder	2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner	One each.

ELECTRICAL

1. Assorted electrical components for house wiring	15 Sets
2. Electrical measuring instruments	10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp	1 each
4. Megger (250V/500V)	1 No.
5. Power Tools: (a) Range Finder	2 Nos
(b) Digital Live-wire detector	2 Nos

ELECTRONICS

1. Soldering guns	10 Nos.
2. Assorted electronic components for making circuits	50 Nos.
3. Small PCBs	10 Nos.
4. Multimeters	10 Nos.

Study purpose items: Telephone, FM radio, low-voltage power supply

MA8352 LINEAR ALGEBRA AND PARTIAL DIFFERENTIAL EQUATIONS L T P C
4 0 0 4

OBJECTIVES:

To introduce the basic notions of groups, rings, fields which will then be used to solve related problems.

To understand the concepts of vector space, linear transformations and diagonalization.

To apply the concept of inner product spaces in orthogonalization.

To understand the procedure to solve partial differential equations.

To give an integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

UNIT I VECTOR SPACES 12

Vector spaces – Subspaces – Linear combinations and linear system of equations – Linear independence and linear dependence – Bases and dimensions.

UNIT II LINEAR TRANSFORMATION AND DIAGONALIZATION 12

Linear transformation - Null spaces and ranges - Dimension theorem - Matrix representation of a linear transformations - Eigenvalues and eigenvectors - Diagonalizability.

UNIT III INNER PRODUCT SPACES 12

Inner product, norms - Gram Schmidt orthogonalization process - Adjoint of linear operations - Least square approximation.

UNIT IV PARTIAL DIFFERENTIAL EQUATIONS 12

Formation – Solutions of first order equations – Standard types and equations reducible to standard types – Singular solutions – Lagrange's linear equation – Integral surface passing through a given curve – Classification of partial differential equations - Solution of linear equations of higher order with constant coefficients – Linear non-homogeneous partial differential equations.

UNIT V FOURIER SERIES SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS 12

Dirichlet's conditions – General Fourier series – Half range sine and cosine series - Method of separation of variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students should be able to:

Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.

Demonstrate accurate and efficient use of advanced algebraic techniques.

Demonstrate their mastery by solving non - trivial problems related to the concepts and by proving simple theorems about the statements proven by the text.

Able to solve various types of partial differential equations.

Able to solve engineering problems using Fourier series.

TEXTBOOKS:

Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.

Friedberg, A.H., Insel, A.J. and Spence, L., “Linear Algebra”, Prentice Hall of India, New Delhi, 2004.

REFERENCES:

Burden, R.L. and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.

James, G. “Advanced Modern Engineering Mathematics”, Pearson Education, 2007.

Kolman, B. Hill, D.R., “Introductory Linear Algebra”, Pearson Education, New Delhi, First Reprint, 2009.

Kumaresan, S., “Linear Algebra – A Geometric Approach”, Prentice – Hall of India, New Delhi, Reprint, 2010.

Lay, D.C., “Linear Algebra and its Applications”, 5th Edition, Pearson Education, 2015.

O’Neil, P.V., “Advanced Engineering Mathematics”, Cengage Learning, 2007.

Strang, G., “Linear Algebra and its applications”, Thomson (Brooks/Cole), New Delhi, 2005.

Sundarapandian, V. “Numerical Linear Algebra”, Prentice Hall of India, New Delhi, 2008.

EC8393 FUNDAMENTALS OF DATA STRUCTURES IN C LTPC 3 003

OBJECTIVES:

To learn the features of C

To learn the linear and non-linear data structures

To explore the applications of linear and non-linear data structures

To learn to represent data using graph data structure

To learn the basic sorting and searching algorithms

UNIT I C PROGRAMMING BASICS 9

Structure of a C program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in C – Managing Input and Output operations – Decision Making and Branching – Looping statements. Arrays – Initialization – Declaration – One dimensional and Two-dimensional arrays. Strings- String operations – String Arrays. Simple programs- sorting-searching – matrix operations.

UNIT II FUNCTIONS, POINTERS, STRUCTURES AND UNIONS 9

Functions – Pass by value – Pass by reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic. Structures and unions - definition – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

UNIT III LINEAR DATA STRUCTURES 9

Arrays and its representations – Stacks and Queues – Linked lists – Linked list-based implementation of Stacks and Queues – Evaluation of Expressions – Linked list based polynomial addition.

UNIT IV NON-LINEAR DATA STRUCTURES 9

Trees – Binary Trees – Binary tree representation and traversals –Binary Search Trees – Applications of trees. Set representations - Union-Find operations. Graph and its representations – Graph Traversals.

UNIT V SEARCHING AND SORTING ALGORITHMS 9

Linear Search – Binary Search. Bubble Sort, Insertion sort – Merge sort – Quick sort - Hash tables – Overflow handling.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to:

Implement linear and non-linear data structure operations using C

Suggest appropriate linear / non-linear data structure for any given data set.

Apply hashing concepts for a given problem

Modify or suggest new data structure for an application

Appropriately choose the sorting algorithm for an application

TEXTBOOKS:

Pradip Dey and Manas Ghosh, —Programming in C, Second Edition, Oxford University Press, 2011.

Ellis Horowitz, Sartaj Sahni, Susan Anderson-**Freed, —Fundamentals of Data Structures in** C, Second Edition, University Press, 2008.

REFERENCES:

1. Mark Allen Weiss, —Data Structures and Algorithm Analysis in C, Second Edition, Pearson Education, 1996

Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, —Data Structures and Algorithms,

Robert Kruse, C.L.Tondo, Bruce Leung, Shashi Mogalla , — Data Structures and Program

Jean-**Paul Tremblay and Paul G. Sorenson, —An Introduction to Data Structures with** Applications, Second Edition, Tata McGraw-Hill, 1991.

EC8351	ELECTRONIC CIRCUITS I	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the methods of biasing transistors

To design and analyze single stage and multistage amplifier circuits

To analyze the frequency response of small signal amplifiers

To design and analyze the regulated DC power supplies.

To troubleshoot and fault analysis of power supplies.

UNIT I BIASING OF DISCRETE BJT, JFET AND MOSFET 9

BJT– Need for biasing - DC Load Line and Bias Point – DC analysis of Transistor circuits - Various biasing methods of BJT – Bias Circuit Design - Thermal stability - Stability factors - Bias compensation techniques using Diode, thermistor and sensistor – Biasing BJT Switching Circuits- JFET - DC Load Line and Bias Point - Various biasing methods of JFET - JFET Bias Circuit Design - MOSFET Biasing - Biasing FET Switching Circuits.

UNIT II BJT AMPLIFIERS 9

Small Signal Hybrid π equivalent circuit of BJT – Early effect - Analysis of CE, CC and CB **amplifiers using Hybrid π equivalent circuits** - AC Load Line Analysis- Darlington Amplifier - Bootstrap technique - Cascade, Cascode configurations - Differential amplifier, Basic BJT differential pair – Small signal analysis and CMRR.

UNIT III SINGLE STAGE FET, MOSFET AMPLIFIERS 9

Small Signal Hybrid π equivalent circuit of FET and MOSFET - Analysis of CS, CD and CG **amplifiers using Hybrid π equivalent circuits** - Basic FET differential pair- BiCMOS circuits.

UNIT IV FREQUENCY RESPONSE OF AMPLIFIERS 9

Amplifier frequency response – Frequency response of transistor amplifiers with circuit capacitors – BJT frequency response – short circuit current gain - cut off frequency – **fα, fβ and unity gain** bandwidth – Miller effect - frequency response of FET - High frequency analysis of CE and MOSFET CS amplifier - Transistor Switching Times.

UNIT V POWER SUPPLIES AND ELECTRONIC DEVICE TESTING 9

Linear mode power supply - Rectifiers - Filters - Half-Wave Rectifier Power Supply - Full-Wave Rectifier Power Supply - Voltage regulators: Voltage regulation - Linear series, shunt and switching Voltage Regulators - Over voltage protection - BJT and MOSFET – Switched mode power supply (SMPS) - Power Supply Performance and Testing - Troubleshooting and Fault Analysis, Design of Regulated DC Power Supply.

TOTAL: 45 PERIODS

OUTCOMES:

After studying this course, the student should be able to:

Acquire knowledge of

- Working principles, characteristics and applications of BJT and FET
- Frequency response characteristics of BJT and FET amplifiers

Analyze the performance of small signal BJT and FET amplifiers - single stage and multi stage amplifiers

Apply the knowledge gained in the design of Electronic circuits

TEXT BOOKS:

Donald. A. Neamen, Electronic Circuits Analysis and Design, 3rd Edition, Mc Graw Hill Education (India) Private Ltd., 2010. (Unit I-IV)

Robert L. Boylestad and Louis Nasheresky, “Electronic Devices and Circuit Theory”, 11th Edition, Pearson Education, 2013. (Unit V)

REFERENCES

Millman J, Halkias.C.and Sathyabrada Jit, Electronic Devices and Circuits, 4th Edition, Mc Graw Hill Education (India) Private Ltd., 2015.

Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits, 4th Edition, , Mc Graw Hill Education (India) Private Ltd., 2017.

Floyd, Electronic Devices, Ninth Edition, Pearson Education, 2012.

David A. Bell, Electronic Devices & Circuits, 5th Edition, Oxford University Press, 2008.

Anwar A. Khan and Kanchan K. Dey, A First Course on Electronics, PHI, 2006.

Rashid M, Microelectronics Circuits, Thomson Learning, 2007.

EC8352 SIGNALS AND SYSTEMS

L	T	P	C
4	0	0	4

OBJECTIVES:

To understand the basic properties of signal & systems

To know the methods of characterization of LTI systems in time domain

To analyze continuous time signals and system in the Fourier and Laplace domain

To analyze discrete time signals and system in the Fourier and Z transform domain

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 12

Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids_ Classification of signals – Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals - Classification of systems- CT systems and DT systems- – Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS 12

Fourier series for periodic signals - Fourier Transform – properties- Laplace Transforms and properties

UNIT III LINEAR TIME INVARIANT CONTINUOUS TIME SYSTEMS 12

Impulse response - convolution integrals- Differential Equation- Fourier and Laplace transforms in Analysis of CT systems - Systems connected in series / parallel.

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS 12

Baseband signal Sampling – Fourier Transform of discrete time signals (DTFT) – Properties of DTFT - Z Transform & Properties

UNIT V LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS 12

Impulse response – Difference equations-Convolution sum- Discrete Fourier Transform and Z Transform Analysis of Recursive & Non-Recursive systems-DT systems connected in series and parallel.

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

To be able to determine if a given system is linear/causal/stable

Capable of determining the frequency components present in a deterministic signal

Capable of characterizing LTI systems in the time domain and frequency domain

To be able to compute the output of an LTI system in the time and frequency domains

TEXT BOOK:

Allan V.Oppenheim, S.Wilsky and S.H.Nawab, “Signals and Systems”, Pearson, 2015.(Unit 1-V)

REFERENCES

B. P. Lathi, “Principles of Linear Systems and Signals”, Second Edition, Oxford, 2009.

R.E.Zeimer, W.H.Tranter and R.D.Fannin, “Signals & Systems - Continuous and Discrete”, Pearson, 2007.

John Alan Stuller, “An Introduction to Signals and Systems”, Thomson, 2007.

EC8392	DIGITAL ELECTRONICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To present the Digital fundamentals, Boolean algebra and its applications in digital systems

To familiarize with the design of various combinational digital circuits using logic gates

To introduce the analysis and design procedures for synchronous and asynchronous sequential circuits

To explain the various semiconductor memories and related technology

To introduce the electronic circuits involved in the making of logic gates

UNIT I DIGITAL FUNDAMENTALS 9

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1‘s and 2‘s complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map Minimization and Quine-McCluskey method of minimization.

UNIT II COMBINATIONAL CIRCUIT DESIGN 9

Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 9

Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design - Moore/Mealy models, state minimization, state assignment, circuit implementation – Design of Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits.

UNIT V MEMORY DEVICES AND DIGITAL INTEGRATED CIRCUITS 9

Basic memory structure – ROM -PROM – EPROM – EEPROM –EAPROM, RAM – Static and dynamic RAM - Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using PLA, PAL.

Digital integrated circuits: Logic levels, propagation delay, power dissipation, fan-out and fan-in, noise margin, logic families and their characteristics-RTL, TTL, ECL, CMOS

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course:

Use digital electronics in the present contemporary world

Design various combinational digital circuits using logic gates

Do the analysis and design procedures for synchronous and asynchronous sequential circuits

Use the semiconductor memories and related technology

Use electronic circuits involved in the design of logic gates

TEXT BOOK:

M. Morris Mano and Michael D. Ciletti, “Digital Design”, 5th Edition, Pearson, 2014.

REFERENCES:

Charles H.Roth. “Fundamentals of Logic Design”, 6th Edition, Thomson Learning, 2013.

Thomas L. Floyd, “Digital Fundamentals”, 10th Edition, Pearson Education Inc, 2011

S.Salivahanan and S.Arivazhagan“Digital Electronics”, Ist Edition, Vikas Publishing House pvt Ltd, 2012.

Anil K.Maini “Digital Electronics”, Wiley, 2014.

A.Anand Kumar “Fundamentals of Digital Circuits”, 4th Edition, PHI Learning Private Limited, 2016.

Soumitra Kumar Mandal “ Digital Electronics”, McGraw Hill Education Private Limited, 2016.

EC8391	CONTROL SYSTEMS ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To introduce the components and their representation of control systems

To learn various methods for analyzing the time response, frequency response and stability of the systems.

To learn the various approach for the state variable analysis.

UNIT I SYSTEMS COMPONENTS AND THEIR REPRESENTATION 9

Control System: Terminology and Basic Structure-Feed forward and Feedback control theory-Electrical and Mechanical Transfer Function Models-Block diagram Models-Signal flow graphs models-DC and AC servo Systems-Synchronous -Multivariable control system

UNIT II TIME RESPONSE ANALYSIS 9

Transient response-steady state response-Measures of performance of the standard first order and second order system-effect on an additional zero and an additional pole-steady error constant and system- type number-PID control-Analytical design for PD, PI,PID control systems

UNIT III FREQUENCY RESPONSE AND SYSTEM ANALYSIS 9

Closed loop frequency response-Performance specification in frequency domain-Frequency response of standard second order system- Bode Plot - Polar Plot- Nyquist plots-Design of compensators using Bode plots-Cascade lead compensation-Cascade lag compensation-Cascade lag-lead compensation

UNIT IV CONCEPTS OF STABILITY ANALYSIS 9

Concept of stability-Bounded - Input Bounded - Output stability-Routh stability criterion-Relative stability-Root locus concept-Guidelines for sketching root locus-Nyquist stability criterion.

UNIT V CONTROL SYSTEM ANALYSIS USING STATE VARIABLE METHODS 9

State variable representation-Conversion of state variable models to transfer functions-Conversion of transfer functions to state variable models-Solution of state equations-Concepts of Controllability and Observability-Stability of linear systems-Equivalence between transfer function and state variable representations-State variable analysis of digital control system-Digital control design using state feedback.

TOTAL:45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

Identify the various control system components and their representations. Analyze the various time domain parameters.

Analysis the various frequency response plots and its system.

Apply the concepts of various system stability criterions.

Design various transfer functions of digital control system using state variable models.

TEXT BOOK:

1. M.Gopal, “Control System – Principles and Design”, Tata McGraw Hill, 4th Edition, 2012.

REFERENCES:

J.Nagrath and M.Gopal, “Control System Engineering”, New Age International Publishers, 5th Edition, 2007.

K. Ogata, ‘Modern Control Engineering’, 5th edition, PHI, 2012.

S.K.Bhattacharya, Control System Engineering, 3rd Edition, Pearson, 2013.

Benjamin.C.Kuo, “Automatic control systems”, Prentice Hall of India, 7th Edition,1995.

EC8381 FUNDAMENTALS OF DATA STRUCTURES IN C LABORATORY L T P C
0 0 4 2

OBJECTIVES:

To understand and implement basic data structures using C

To apply linear and non-linear data structures in problem solving.

To learn to implement functions and recursive functions by means of data structures

To implement searching and sorting algorithms

LIST OF EXERCISES

Basic C Programs – looping, data manipulations, arrays
Programs using strings – string function implementation
Programs using structures and pointers
Programs involving dynamic memory allocations
Array implementation of stacks and queues
Linked list implementation of stacks and queues
Application of Stacks and Queues
Implementation of Trees, Tree Traversals
Implementation of Binary Search trees
Implementation of Linear search and binary search
Implementation Insertion sort, Bubble sort, Quick sort and Merge Sort
Implementation Hash functions, collision resolution technique

TOTAL:60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Write basic and advanced programs in C

Implement functions and recursive functions in C Implement data structures using C

Choose appropriate sorting algorithm for an application and implement it in a modularized way

EC8361 ANALOG AND DIGITAL CIRCUITS LABORATORY L T P C
0 0 4 2

OBJECTIVES:

The student should be made to:

Study the Frequency response of CE, CB and CC Amplifier

Learn the frequency response of CS Amplifiers

Study the Transfer characteristics of differential amplifier

Perform experiment to obtain the bandwidth of single stage and multistage amplifiers

Perform SPICE simulation of Electronic Circuits

Design and implement the Combinational and sequential logic circuits

LIST OF ANALOG EXPERIMENTS:

Design of Regulated Power supplies
Frequency Response of CE, CB, CC and CS amplifiers
Darlington Amplifier
Differential Amplifiers - Transfer characteristics, CMRR Measurement
Cascode and Cascade amplifiers
Determination of bandwidth of single stage and multistage amplifiers
Analysis of BJT with Fixed bias and Voltage divider bias using Spice
Analysis of FET, MOSFET with fixed bias, self-bias and voltage divider bias using simulation software like Spice

Analysis of Cascode and Cascade amplifiers using Spice

Analysis of Frequency Response of BJT and FET using Spice

LIST OF DIGITAL EXPERIMENTS

Design and implementation of code converters using logic gates(i) BCD to excess-3 code and vice versa (ii) Binary to gray and vice-versa

Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC 7483

Design and implementation of Multiplexer and De-multiplexer using logic gates

Design and implementation of encoder and decoder using logic gates

Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters

Design and implementation of 3-bit synchronous up/down counter

TOTAL : 60 PERIODS

OUTCOMES:

On completion of this laboratory course, the student should be able to:

Design and Test rectifiers, filters and regulated power supplies.

Design and Test BJT/JFET amplifiers.

Differentiate cascode and cascade amplifiers.

Analyze the limitation in bandwidth of single stage and multi stage amplifier Measure CMRR in differential amplifier

Simulate and analyze amplifier circuits using PSpice.

Design and Test the digital logic circuits.

LAB REQUIREMENTS FOR A BATCH OF 30 STUDENTS, 2 STUDENTS / EXPERIMENT:

S.NO	EQUIPMENTS FOR ANALOG LAB
	CRO/DSO (30MHz) – 15 Nos.
	Signal Generator /Function Generators (3 MHz) – 15 Nos
3	Dual Regulated Power Supplies (0 – 30V) – 15 Nos.
4	Standalone desktop PCs with SPICE software – 15 Nos.
	Transistor/FET (BJT-NPN-PNP and NMOS/PMOS) – 50 Nos
	Components and Accessories: Resistors, Capacitors, Inductors, diodes, Zener Diodes, Bread Boards, Transformers.
	SPICE Circuit Simulation Software: (any public domain or commercial software)

S.NO	EQUIPMENTS FOR DIGITAL LAB
	Dual power supply/ single mode power supply - 15 Nos
2	IC Trainer Kit - 15 Nos
3	Bread Boards - 15 Nos
4	Seven segment display -15 Nos
5	Multimeter - 15 Nos
	ICs each 50 Nos 7400/ 7402 / 7404 / 7486 / 7408 / 7432 / 7483 / 74150 / 74151 / 74147 / 7445 / 7476/7491/ 555 / 7494 / 7447 / 74180 / 7485 / 7473 / 74138 / 7411 / 7474

HS8381 INTERPERSONAL SKILLS/LISTENING&SPEAKING LTPC

0 0 2 1

OBJECTIVES:

The Course will enable learners to:

Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.

Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.

improve general and academic listening skills

Make effective presentations.

UNIT I

Listening as a key skill- its importance- speaking - give personal information - ask for personal information - express ability - enquire about ability - ask for clarification Improving pronunciation pronunciation basics taking lecture notes - preparing to listen to a lecture - articulate a complete idea as opposed to producing fragmented utterances.

UNIT II

Listen to a process information- give information, as part of a simple explanation - conversation starters: small talk - stressing syllables and speaking clearly - intonation patterns - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

UNIT III

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk - greet - respond to greetings - describe health and symptoms - invite and offer - accept - decline - take leave - listen for and follow the gist- listen for detail

UNIT IV

Being an active listener: giving verbal and non-verbal feedback - participating in a group discussion - summarizing academic readings and lectures conversational speech listening to and participating in conversations - persuade.

UNIT V

Formal and informal talk - listen to follow and respond to explanations, directions and instructions in academic and business contexts - strategies for presentations and interactive communication - group/pair presentations - negotiate disagreement in group work.

TOTAL :30PERIODS

OUTCOMES:

At the end of the course Learners will be able to:

Listen and respond appropriately.

Participate in group discussions

Make effective presentations

Participate confidently and appropriately in conversations both formal and informal

TEXT BOOKS:

Brooks,Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011.
Richards,C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010

REFERENCES

Bhatnagar, Nitin and MamtaBhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.
Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.
Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.

Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.

Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford, 2014

MA8451	PROBABILITY AND RANDOM PROCESSES	L	T	P	C
		4	0	0	4

OBJECTIVES :

To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.

To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.

To understand the basic concepts of random processes which are widely used in IT fields.
To understand the concept of correlation and spectral densities.

To understand the significance of linear systems with random inputs.

UNIT I PROBABILITY AND RANDOM VARIABLES 12

Probability – Axioms of probability – Conditional probability – Baye's theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

UNIT II TWO - DIMENSIONAL RANDOM VARIABLES 12

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III RANDOM PROCESSES 12

Classification – Stationary process – Markov process - Markov chain - Poisson process – Random telegraph process.

UNIT IV CORRELATION AND SPECTRAL DENSITIES 12

Auto correlation functions – Cross correlation functions – Properties – Power spectral density – Cross spectral density – Properties.

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS 12

Linear time invariant system – System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

TOTAL : 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students should be able to:

Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.

Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.

Apply the concept random processes in engineering disciplines.

Understand and apply the concept of correlation and spectral densities.

The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable. Able to analyze the response of random inputs to linear time invariant systems.

TEXT BOOKS:

Ibe, O.C.," Fundamentals of Applied Probability and Random Processes ", 1st Indian Reprint, Elsevier, 2007.

Peebles, P.Z., "Probability, Random Variables and Random Signal Principles ", Tata McGraw Hill, 4th Edition, New Delhi, 2002.

REFERENCES:

Cooper. G.R., McGillem. C.D., "Probabilistic Methods of Signal and System Analysis", Oxford University Press, New Delhi, 3rd Indian Edition, 2012.

Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes ", Tata McGraw Hill Edition, New Delhi, 2004.

Miller. S.L. and Childers. D.G., "Probability and Random Processes with Applications to Signal Processing and Communications ", Academic Press, 2004.

Stark. H. and Woods. J.W., "Probability and Random Processes with Applications to Signal Processing ", Pearson Education, Asia, 3rd Edition, 2002.

Yates. R.D. and Goodman. D.J., "Probability and Stochastic Processes", Wiley India Pvt. Ltd., Bangalore, 2nd Edition, 2012.

EC8452	ELECTRONIC CIRCUITS II	L	T	P	C
		3	0	0	3

OBJECTIVES:

To give a comprehensive exposure to all types of amplifiers and oscillators constructed with discrete components. This helps to develop a strong basis for building linear and digital integrated circuits

To study about feedback amplifiers and oscillators principles To design oscillators.

To study about turned amplifier.

To understand the analysis and design of LC and RC oscillators, amplifiers, multi vibrators, power amplifiers and DC convertors.

UNIT I FEEDBACK AMPLIFIERS AND STABILITY 9

Feedback Concepts – gain with feedback – effect of feedback on gain stability, distortion, bandwidth, input and output impedances; topologies of feedback amplifiers – analysis of series-series, shunt-shunt and shunt-series feedback amplifiers-stability problem-Gain and Phase-margins-Frequency compensation.

UNIT II OSCILLATORS 9

Barkhausen criterion for oscillation – phase shift, Wien bridge - Hartley & Colpitt's oscillators – Clapp oscillator-Ring oscillators and crystal oscillators – oscillator amplitude stabilization.

UNIT III TUNED AMPLIFIERS 9

Coil losses, unloaded and loaded Q of tank circuits, small signal tuned amplifiers – Analysis of capacitor coupled single tuned amplifier **–** double tuned amplifier - effect of cascading single tuned and double tuned amplifiers on bandwidth – Stagger tuned amplifiers - Stability of tuned amplifiers – Neutralization - Hazeltine neutralization method.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS 9

Pulse circuits – attenuators – RC integrator and differentiator circuits – diode clampers and clippers –Multivibrators - Schmitt Trigger- UJT Oscillator.

UNIT V POWER AMPLIFIERS AND DC CONVERTERS 9

Power amplifiers- class A-Class B-Class AB-Class C-Power MOSFET-Temperature Effect- Class AB Power amplifier using MOSFET –DC/DC convertors – Buck, Boost, Buck-Boost analysis and design

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

Analyze different types of amplifier, oscillator and multivibrator circuits
Design BJT amplifier and oscillator circuits

Analyze transistorized amplifier and oscillator circuits
Design and analyze feedback amplifiers

Design LC and RC oscillators, tuned amplifiers, wave shaping circuits, multivibrators, power amplifier and DC convertors.

TEXT BOOKS:

Sedra and Smith, "Micro Electronic Circuits"; Sixth Edition, Oxford University Press, 2011. (UNIT I, III,IV,V)

Jacob Millman, 'Microelectronics', McGraw Hill, 2nd Edition, Reprinted, 2009. (UNIT I,II,IV,V)

REFERENCES:

Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", 10th Edition, Pearson Education / PHI, 2008

David A. Bell, "Electronic Devices and Circuits", Fifth Edition, Oxford University Press, 2008.

Millman J. and Taub H., "Pulse Digital and Switching Waveforms", TMH, 2000.

Millman and Halkias. C., Integrated Electronics, TMH, 2007.

EC8491	COMMUNICATION THEORY	L	T	P	C
		3	0	0	3

OBJECTIVES:

To introduce the concepts of various analog modulations and their spectral characteristics
To understand the properties of random process
To know the effect of noise on communication systems
To know the principles of sampling & quantization

UNIT I AMPLITUDE MODULATION 9

Amplitude Modulation- DSBSC, DSBFC, SSB, VSB - Modulation index, Spectra, Power relations and Bandwidth – AM Generation – Square law and Switching modulator, DSBSC Generation – Balanced and Ring Modulator, SSB Generation – Filter, Phase Shift and Third Methods, VSB Generation – Filter Method, Hilbert Transform, Pre-envelope & complex envelope –comparison of different AM techniques, Superheterodyne Receiver

UNIT II ANGLE MODULATION 9

Phase and frequency modulation, Narrow Band and Wide band FM – Modulation index, Spectra, Power relations and Transmission Bandwidth - FM modulation –Direct and Indirect methods, FM Demodulation – FM to AM conversion, FM Discriminator - PLL as FM Demodulator.

UNIT III RANDOM PROCESS 9

Random variables, Random Process, Stationary Processes, Mean, Correlation & Covariance functions, Power Spectral Density, Ergodic Processes, Gaussian Process, Transmission of a Random Process Through a LTI filter.

UNIT IV NOISE CHARACTERIZATION 9

Noise sources – Noise figure, noise temperature and noise bandwidth – Noise in cascaded systems. Representation of Narrow band noise –In-phase and quadrature, Envelope and Phase – Noise performance analysis in AM & FM systems – Threshold effect, Pre-emphasis and de-emphasis for FM.

UNIT V SAMPLING & QUANTIZATION 9

Low pass sampling – Aliasing- Signal Reconstruction-Quantization - Uniform & non-uniform quantization - quantization noise - Logarithmic Companding –PAM, PPM, PWM, PCM – TDM, FDM.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Design AM communication systems
Design Angle modulated communication systems
Apply the concepts of Random Process to the design of Communication systems
Analyze the noise performance of AM and FM systems
Gain knowledge in sampling and quantization

TEXT BOOKS:

J.G.Proakis, M.Salehi, “Fundamentals of Communication Systems”, Pearson Education 2014. (UNIT I-IV)
Simon Haykin, “Communication Systems”, 4th Edition, Wiley, 2014.(UNIT I-V)

REFERENCES:

B.P.Lathi, “Modern Digital and Analog Communication Systems”, 3rd Edition, Oxford University Press, 2007.

D.Roody, **J.Coolen, —Electronic Communications, 4th edition PHI 2006**

A.Papoulis, “Probability, Random variables and Stochastic Processes”, McGraw Hill, 3rd edition, 1991.

B.Sklar, “Digital Communications Fundamentals and Applications”, 2nd Edition Pearson Education 2007

H P Hsu, Schaum Outline Series - “Analog and Digital Communications” TMH 2006

Couch.L., "Modern Communication Systems", Pearson, 2001.

EC8451	ELECTROMAGNETIC FIELDS	L	T	P	C
		4	0	0	4

OBJECTIVES:

To gain conceptual and basic mathematical understanding of electric and magnetic fields in free space and in materials

To understand the coupling between electric and magnetic fields through Faraday's law, displacement current and Maxwell's equations

To understand wave propagation in lossless and in lossy media

To be able to solve problems based on the above concepts

UNIT I INTRODUCTION **12**

Electromagnetic model, Units and constants, Review of vector algebra, Rectangular, cylindrical and spherical coordinate systems, Line, surface and volume integrals, Gradient of a scalar field, Divergence of a vector field, Divergence theorem, Curl of a vector field, Stoke's theorem, Null identities, Helmholtz's theorem

UNIT II ELECTROSTATICS **12**

Electric field, Coulomb's law, Gauss's law and applications, Electric potential, Conductors in static electric field, Dielectrics in static electric field, Electric flux density and dielectric constant, Boundary conditions, Capacitance, Parallel, cylindrical and spherical capacitors, Electrostatic energy, Poisson's and Laplace's equations, Uniqueness of electrostatic solutions, Current density and Ohm's law, Electromotive force and Kirchhoff's voltage law, Equation of continuity and Kirchhoff's current law

UNIT III MAGNETOSTATICS **12**

Lorentz force equation, Law of no magnetic monopoles, Ampere's law, Vector magnetic potential, Biot-Savart law and applications, Magnetic field intensity and idea of relative permeability, Magnetic circuits, Behaviour of magnetic materials, Boundary conditions, Inductance and inductors, Magnetic energy, Magnetic forces and torques

UNIT IV TIME-VARYING FIELDS AND MAXWELL's EQUATIONS **12**

Faraday's law, Displacement current and Maxwell-Ampere law, Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave equations and solutions, Time-harmonic fields

UNIT V PLANE ELECTROMAGNETIC WAVES **12**

Plane waves in lossless media, Plane waves in lossy media (low-loss dielectrics and good conductors), Group velocity, Electromagnetic power flow and Poynting vector, Normal incidence at a plane conducting boundary, Normal incidence at a plane dielectric boundary

TOTAL:60 PERIODS

OUTCOMES:

By the end of this course, the student should be able to:

Display an understanding of fundamental electromagnetic laws and concepts

Write Maxwell's equations in integral, differential and phasor forms and explain their physical meaning

Explain electromagnetic wave propagation in lossy and in lossless media

Solve simple problems requiring estimation of electric and magnetic field quantities based on these concepts and laws

TEXT BOOKS:

D.K. Cheng, Field and wave electromagnetics, 2nd ed., Pearson (India), 1989 (UNIT I, II,III IV,V)

W.H. Hayt and J.A. Buck, Engineering electrmagnetics, 7th ed., McGraw-Hill (India), 2006 (UNIT I-V)

REFERENCES

D.J. Griffiths, Introduction to electrodynamics, 4th ed., Pearson (India), 2013

B.M. Notaros, Electromagnetics, Pearson: New Jersey, 2011

M.N.O. Sadiku and S.V. Kulkarni, Principles of electromagnetics, 6th ed., Oxford (Asian Edition), 2015

		L	T	P	C
EC8453	**LINEAR INTEGRATED CIRCUITS**	**3**	**0**	**0**	**3**

OBJECTIVES:

To introduce the basic building blocks of linear integrated circuits

To learn the linear and non-linear applications of operational amplifiers To introduce the theory and applications of analog multipliers and PLL To learn the theory of ADC and DAC

To introduce the concepts of waveform generation and introduce some special function ICs

UNIT I BASICS OF OPERATIONAL AMPLIFIERS 9

Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Basic information about op-amps – Ideal Operational Amplifier - General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations – JFET Operational Amplifiers – LF155 and TL082.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.

UNIT III ANALOG MULTIPLIER AND PLL 9

Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell – Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing and clock synchronisation.

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS **9**

Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode *R - 2R* Ladder types - switches for D/A converters, high speed sample-and-hold circuits, A/D Converters – specifications - Flash type - Successive Approximation type - Single Slope type – Dual Slope type - A/D Converter using Voltage-to-Time Conversion - Over-sampling A/D Converters, Sigma – Delta converters.

UNIT V WAVEFORM GENERATORS AND SPECIAL FUNCTION ICS **9**

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, ICL8038 function generator, Timer IC 555, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator - Monolithic switching regulator, Low Drop – Out(LDO) Regulators - Switched capacitor filter IC MF10, Frequency to Voltage and Voltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto-couplers and fibre optic IC.

TOTAL:45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

Design linear and non linear applications of OP – AMPS

Design applications using analog multiplier and PLL

Design ADC and DAC using OP – AMPS

Generate waveforms using OP – AMP

Circuits Analyze special function ICs

TEXT BOOKS:

D.Roy Choudhry, Shail Jain, “Linear Integrated Circuits”, New Age International Pvt. Ltd., 2018, Fifth Edition. (Unit I – V)

Sergio Franco, “Design with Operational Amplifiers and Analog Integrated Circuits”, 4th Edition, Tata Mc Graw-Hill, 2016 (Unit I – V)

REFERENCES:

Ramakant A. Gayakwad, “OP-AMP and Linear ICs”, 4th Edition, Prentice Hall / Pearson Education, 2015.

Robert F.Coughlin, Frederick F.Driscoll, “Operational Amplifiers and Linear Integrated Circuits”, Sixth Edition, PHI, 2001.

B.S.Sonde, “System design using Integrated Circuits” , 2nd Edition, New Age Pub, 2001.

Gray and Meyer, “Analysis and Design of Analog Integrated Circuits”, Wiley International,5th Edition, 2009.

William D.Stanley, “Operational Amplifiers with Linear Integrated Circuits”, Pearson Education,4th Edition,2001.

S.Salivahanan & V.S. Kanchana Bhaskaran, “Linear Integrated Circuits”, TMH,2nd Edition, 4th Reprint, 2016.

GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING LTPC
3 0 0 3

OBJECTIVES:

To study the nature and facts about environment.

To finding and implementing scientific, technological, economic and political solutions to environmental problems.

To study the interrelationship between living organism and environment.

To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.

To study the dynamic processes and understand the features of the earth**"s interior and** surface.

To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7 From unsustainable to sustainable development – urban problems related to energy –

water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

Public awareness of environmental is at infant stage.

Ignorance and incomplete knowledge has lead to misconceptions

Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS:

Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.

Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCES :

Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD,New Delhi, 2007.

Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) PVT, LTD, Hydrabad, 2015.

Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.

G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.

EC8461 CIRCUITS DESIGN AND SIMULATION LABORATORY L T P C
0 0 4 2

OBJECTIVES:

To gain hands on experience in designing electronic circuits To learn simulation software used in circuit design

To learn the fundamental principles of amplifier circuits

To differentiate feedback amplifiers and oscillators.

To differentiate the operation of various multivibrators

DESIGN AND ANALYSIS OF THE FOLLOWING CIRCUITS

Series and Shunt feedback amplifiers-Frequency response, Input and output impedance
RC Phase shift oscillator and Wien Bridge Oscillator
Hartley Oscillator and Colpitts Oscillator
Single Tuned Amplifier
RC Integrator and Differentiator circuits
Astable and Monostable multivibrators
Clippers and Clampers

SIMULATION USING SPICE (Using Transistor):

Tuned Collector Oscillator
Twin -T Oscillator / Wein Bridge Oscillator
Double and Stagger tuned Amplifiers
Bistable Multivibrator
Schmitt Trigger circuit with Predictable hysteresis
Analysis of power amplifier

TOTAL: 60 PERIODS

OUTCOMES:

On completion of this laboratory course, the student should be able to:

Analyze various types of feedback amplifiers

Design oscillators, tuned amplifiers, wave-shaping circuits and multivibrators

Design and simulate feedback amplifiers, oscillators, tuned amplifiers, wave-shaping circuits and multivibrators using SPICE Tool.

LAB REQUIREMENT FOR A BATCH OF 30 STUDENTS / 2 STUDENTS PER EXPERIMENT:

S.NO	EQUIPMENTS	
1	CRO (Min 30MHz)	- 15Nos
2	Signal Generator /Function Generators (2 MHz)	– 15Nos
3	Dual Regulated Power Supplies (0 – 30V)	- 15 Nos
4	Digital Multimeter	- 15 Nos
5	Digital LCR Meter	- 2 Nos
6	Standalone desktops PC	- 15 Nos
7	Transistor/FET (BJT-NPN-PNP and NMOS/PMOS)	- 50 Nos

Components and Accessories:

Transistors, Resistors, Capacitors, Inductors, diodes, Zener Diodes, Bread Boards, Transformers.
SPICE Circuit Simulation Software: (any public domain or commercial software)

EC8462 LINEAR INTEGRATED CIRCUITS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

To understand the basics of linear integrated circuits and available ICs To understand the characteristics of the operational amplifier.

To apply operational amplifiers in linear and nonlinear applications.

To acquire the basic knowledge of special function IC.

To use SPICE software for circuit design

DESIGN AND TESTING OF THE FOLLOWING CIRCUITS

Inverting, Non inverting and differential amplifiers.

Integrator and Differentiator.
Instrumentation amplifier
Active low-pass, High-pass and band-pass filters.
Astable & Monostable multivibrators using Op-amp
Schmitt Trigger using op-amp.
Phase shift and Wien bridge oscillators using Op-amp.
Astable and Monostable multivibrators using NE555 Timer.
PLL characteristics and its use as Frequency Multiplier, Clock synchronization
R-2R Ladder Type D- A Converter using Op-amp.
DC power supply using LM317 and LM723.
Study of SMPS

SIMULATION USING SPICE:

Active low-pass, High-pass and band-pass filters using Op-amp
Astable and Monostable multivibrators using NE555 Timer.
A/ D converter
Analog multiplier

TOTAL: 60 PERIODS

OUTCOMES:

On completion of this laboratory course, the student should be able to:

Design amplifiers, oscillators, D-A converters using operational amplifiers.

Design filters using op-amp and performs an experiment on frequency response. Analyze the working of PLL and describe its application as a frequency multiplier. Design DC power supply using ICs.

Analyze the performance of filters, multivibrators, A/D converter and analog multiplier using SPICE.

LAB REQUIREMENT FOR A BATCH OF 30 STUDENTS / 2 STUDENTS PER EXPERIMENT:

S.NO	EQUIPMENTS	
1	CRO/DSO (Min 30MHz)	-- 15Nos
2	Signal Generator /Function Generators (2 MHz)	– 15Nos
3	Dual Regulated Power Supplies (0 – 30V)	-- 15 Nos
4	Digital Multimeter	-- 15 Nos
5	IC Tester	-- 5 Nos
6	Standalone desktops PC	-- 15 Nos
7	Components and Accessories	– 50 Nos

Components and Accessories:

Transistors, Resistors, Capacitors, diodes, Zener diodes, Bread Boards, Transformers, wires, Power transistors, Potentiometer, A/D and D/A convertors, LEDs .

Note: Op-Amps uA741, LM 301, LM311, LM 324, LM317, LM723, 7805, 7812, 2N3524, 2N3525, 2N3391, AD 633, LM 555, LM 565 may be used.

EC8501	DIGITAL COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

To study the limits set by Information Theory

To study the various waveform coding schemes

To learn the various baseband transmission schemes

To understand the various band pass signaling schemes

To know the fundamentals of channel coding

UNIT I INFORMATION THEORY **9**

Discrete Memoryless source, Information, Entropy, Mutual Information - Discrete Memoryless channels – Binary Symmetric Channel, Channel Capacity - Hartley - Shannon law - Source coding theorem - Shannon - Fano & Huffman codes.

UNIT II WAVEFORM CODING & REPRESENTATION **9**

Prediction filtering and DPCM - Delta Modulation - ADPCM & ADM principles-Linear Predictive Coding- Properties of Line codes- Power Spectral Density of Unipolar / Polar RZ & NRZ – Bipolar NRZ - Manchester

UNIT III BASEBAND TRANSMISSION & RECEPTION **9**

ISI – Nyquist criterion for distortion less transmission – Pulse shaping – Correlative coding - Eye pattern – Receiving Filters- Matched Filter, Correlation receiver, Adaptive Equalization

UNIT IV DIGITAL MODULATION SCHEME **9**

Geometric Representation of signals - Generation, detection, PSD & BER of Coherent BPSK, BFSK & QPSK - QAM - Carrier Synchronization - Structure of Non-coherent Receivers - Principle of DPSK.

UNIT V ERROR CONTROL CODING **9**

Channel coding theorem - Linear Block codes - Hamming codes - Cyclic codes - Convolutional codes - Viterbi Decoder.

TOTAL:45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to

Design PCM systems

Design and implement base band transmission schemes

Design and implement band pass signaling schemes

Analyze the spectral characteristics of band pass signaling schemes and their noise performance

Design error control coding schemes

TEXT BOOK:

1. S. Haykin, “Digital Communications”, John Wiley, 2005 (Unit I –V)

REFERENCES

B. Sklar, “Digital Communication Fundamentals and Applications”, 2nd Edition, Pearson Education, 2009

B.P.Lathi, “Modern Digital and Analog Communication Systems” 3rd Edition, Oxford University Press 2007.

H P Hsu, Schaum Outline Series - “Analog and Digital Communications”, TMH 2006

J.G Proakis, “Digital Communication”, 4th Edition, Tata Mc Graw Hill Company, 2001.

EC8553	DISCRETE-TIME SIGNAL PROCESSING	L	T	P	C
		4	0	0	4

OBJECTIVES:

To learn discrete fourier transform, properties of DFT and its application to linear filtering
To understand the characteristics of digital filters, design digital IIR and FIR filters and apply these filters to filter undesirable signals in various frequency bands To understand the effects of finite precision representation on digital filters
To understand the fundamental concepts of multi rate signal processing and its applications
To introduce the concepts of adaptive filters and its application to communication engineering

UNIT I DISCRETE FOURIER TRANSFORM 12

Review of signals and systems, concept of frequency in discrete-time signals, summary of analysis & synthesis equations for FT & DTFT, frequency domain sampling, Discrete Fourier transform (DFT) - deriving DFT from DTFT, properties of DFT - periodicity, symmetry, circular convolution. Linear filtering using DFT. Filtering long data sequences - overlap save and overlap add method. Fast computation of DFT - Radix-2 Decimation-in-time (DIT) Fast Fourier transform (FFT), Decimation-in-frequency (DIF) Fast Fourier transform (FFT). Linear filtering using FFT.

UNIT II INFINITE IMPULSE RESPONSE FILTERS 12

Characteristics of practical frequency selective filters. characteristics of commonly used analog filters - Butterworth filters, Chebyshev filters. Design of IIR filters from analog filters (LPF, HPF, BPF, BRF) - Approximation of derivatives, Impulse invariance method, Bilinear transformation. Frequency transformation in the analog domain. Structure of IIR filter - direct form I, direct form II, Cascade, parallel realizations.

UNIT III FINITE IMPULSE RESPONSE FILTERS 12

Design of FIR filters - symmetric and Anti-symmetric FIR filters - design of linear phase FIR filters using Fourier series method - FIR filter design using windows (Rectangular, Hamming and Hanning window), Frequency sampling method. FIR filter structures - linear phase structure, direct form realizations

UNIT IV FINITE WORD LENGTH EFFECTS 12

Fixed point and floating point number representation - ADC - quantization - truncation and rounding - quantization noise - input / output quantization - coefficient quantization error - product quantization error - overflow error - limit cycle oscillations due to product quantization and summation - scaling to prevent overflow.

UNIT V INTRODUCTION TO DIGITAL SIGNAL PROCESSORS 12

DSP functionalities - circular buffering – DSP architecture – Fixed and Floating point architecture principles – Programming – Application examples.

TOTAL:60PERIODS

OUTCOMES:

At the end of the course, the student should be able to

Apply DFT for the analysis of digital signals and systems
Design IIR and FIR filters
Characterize the effects of finite precision representation on digital filters
Design multirate filters
Apply adaptive filters appropriately in communication systems

TEXT BOOK:

John G. Proakis & Dimitris G.Manolakis, "Digital Signal Processing – Principles, Algorithms & Applications", Fourth Edition, Pearson Education / Prentice Hall, 2007. (UNIT I – V)

REFERENCES:

Emmanuel C. Ifeachor & Barrie. W. Jervis, "Digital Signal Processing", Second Edition, Pearson Education / Prentice Hall, 2002.

A. V. Oppenheim, R.W. Schafer and J.R. Buck, "Discrete-Time Signal Processing", 8th Indian Reprint, Pearson, 2004.

Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", Tata Mc Graw Hill, 2007.

Andreas Antoniou, "Digital Signal Processing", Tata Mc Graw Hill, 2006.

EC8552 COMPUTER ARCHITECTURE AND ORGANIZATION L T P C
3 0 0 3

OBJECTIVES:

To make students understand the basic structure and operation of digital computer

To familiarize with implementation of fixed point and floating-point arithmetic operations
To study the design of data path unit and control unit for processor

To understand the concept of various memories and
interfacing To introduce the parallel processing technique

UNIT I COMPUTER ORGANIZATION & INSTRUCTIONS 9

Basics of a computer system: Evolution, Ideas, Technology, Performance, Power wall, Uniprocessors to Multiprocessors. Addressing and addressing modes. Instructions: Operations and Operands, Representing instructions, Logical operations, control operations.

UNIT II ARITHMETIC 9

Fixed point Addition, Subtraction, Multiplication and Division. Floating Point arithmetic, High performance arithmetic, Subword parallelism

UNIT III THE PROCESSOR 9

Introduction, Logic Design Conventions, Building a Datapath - A Simple Implementation scheme - An Overview of Pipelining - Pipelined Datapath and Control. Data Hazards: Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions.

UNIT IV MEMORY AND I/O ORGANIZATION 9

Memory hierarchy, Memory Chip Organization, Cache memory, Virtual memory.

Parallel Bus Architectures, Internal Communication Methodologies, Serial Bus Architectures, Mass storage, Input and Output Devices.

UNIT V ADVANCED COMPUTER ARCHITECTURE 9

Parallel processing architectures and challenges, Hardware multithreading, Multicore and shared memory multiprocessors, Introduction to Graphics Processing Units, Clusters and Warehouse scale computers - Introduction to Multiprocessor network topologies.

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to

Describe data representation, instruction formats and the operation of a digital computer Illustrate the fixed point and floating-point arithmetic for ALU operation

Discuss about implementation schemes of control unit and pipeline performance

Explain the concept of various memories, interfacing and organization of multiple processors Discuss parallel processing technique and unconventional architectures

TEXT BOOKS:

David A. Patterson and John L. Hennessey, “Computer Organization and Design”, Fifth edition, Morgan Kauffman / Elsevier, 2014. (UNIT I-V)

Miles J. Murdocca and Vincent P. Heuring, “Computer Architecture and Organization: An Integrated approach”, Second edition, Wiley India Pvt Ltd, 2015 (UNIT IV,V)

REFERENCES

1. V. Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, “Computer Organization“, Fifth edition, Mc Graw-Hill Education India Pvt Ltd, 2014.

William Stallings “Computer Organization and Architecture”, Seventh Edition, Pearson Education, 2006.

Govindarajalu, “Computer Architecture and Organization, Design Principles and Applications", Second edition, McGraw-Hill Education India Pvt Ltd, 2014.

EC8551	COMMUNICATION NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The student should be made to:

Understand the division of network functionalities into layers.

Be familiar with the components required to build different types of networks

Be exposed to the required functionality at each layer

Learn the flow control and congestion control algorithms

UNIT I FUNDAMENTALS & LINK LAYER 9

Overview of Data Communications- Networks – Building Network and its types– Overview of Internet - Protocol Layering - OSI Mode – Physical Layer – Overview of Data and Signals - introduction to Data Link Layer - Link layer Addressing- Error Detection and Correction

UNIT II MEDIA ACCESS & INTERNETWORKING 9

Overview of Data link Control and Media access control - Ethernet (802.3) - Wireless LANs – Available Protocols – Bluetooth – Bluetooth Low Energy – WiFi – 6LowPAN–Zigbee - Network layer services – Packet Switching – IPV4 Address – Network layer protocols (IP, ICMP, Mobile IP)

of Intradomain and interdomain protocols – Overview of IPv6 Addressing – Transition from IPv4 to IPv6

UNIT IV TRANSPORT LAYER 9

Introduction to Transport layer –Protocols- User Datagram Protocols (UDP) and Transmission Control Protocols (TCP) –Services – Features – TCP Connection – State Transition Diagram – Flow, Error and Congestion Control - Congestion avoidance (DECbit, RED) – QoS – Application requirements

UNIT V APPLICATION LAYER 9

Application Layer Paradigms – Client Server Programming – World Wide Web and HTTP - DNS- - Electronic Mail (SMTP, POP3, IMAP, MIME) – Introduction to Peer to Peer Networks – Need for Cryptography and Network Security – Firewalls.

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Identify the components required to build different types of networks Choose the required functionality at each layer for given application Identify solution for each functionality at each layer

Trace the flow of information from one node to another node in the network

TEXT BOOK:

Behrouz A. Forouzan, “Data communication and Networking”, Fifth Edition, Tata McGraw – Hill, 2013 (UNIT I –V)

REFERENCES

James F. Kurose, Keith W. Ross, “Computer Networking - A Top-Down Approach Featuring the Internet”, Seventh Edition, Pearson Education, 2016.

Nader. F. Mir,“ Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2nd Edition, 2014.

Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, Mc Graw Hill Publisher, 2011.

Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.

EC8562 DIGITAL SIGNAL PROCESSING LABORATORY L TPC 0042

OBJECTIVES:

The student should be made:

To perform basic signal processing operations such as Linear Convolution, Circular Convolution, Auto Correlation, Cross Correlation and Frequency analysis in MATLAB

To implement FIR and IIR filters in MATLAB and DSP Processor

To study the architecture of DSP processor

To design a DSP system to demonstrate the Multi-rate and Adaptive signal processing concepts.

LIST OF EXPERIMENTS: MATLAB / EQUIVALENT SOFTWARE PACKAGE

Generation of elementary Discrete-Time sequences

Linear and Circular convolutions

Auto correlation and Cross Correlation

Frequency Analysis using DFT

Design of FIR filters (LPF/HPF/BPF/BSF) and demonstrates the filtering operation

Design of Butterworth and Chebyshev IIR filters (LPF/HPF/BPF/BSF) and demonstrate the filtering operations

DSP PROCESSOR BASED IMPLEMENTATION

Study of architecture of Digital Signal Processor

Perform MAC operation using various addressing modes

Generation of various signals and random noise

Design and demonstration of FIR Filter for Low pass, High pass, Band pass and Band stop filtering

Design and demonstration of Butter worth and Chebyshev IIR Filters for Low pass, High pass, Band pass and Band stop filtering

Implement an Up-sampling and Down-sampling operation in DSP Processor

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Carryout basic signal processing operations

Demonstrate their abilities towards MATLAB based implementation of various DSP systems

Analyze the architecture of a DSP Processor

Design and Implement the FIR and IIR Filters in DSP Processor for performing filtering operation over real-time signals

Design a DSP system for various applications of DSP

EC8561 COMMUNICATION SYSTEMS LABORATORY L TPC 0042

OBJECTIVES:

The student should be made:

To visualize the effects of sampling and TDM

To Implement AM & FM modulation and demodulation To implement PCM & DM

To simulate Digital Modulation schemes

To simulate Error control coding schemes

LIST OF EXPERIMENTS:

Signal Sampling and reconstruction
Time Division Multiplexing
AM Modulator and Demodulator
FM Modulator and Demodulator
Pulse Code Modulation and Demodulation
Delta Modulation and Demodulation
Line coding schemes
Simulation of ASK, FSK, and BPSK generation schemes
Simulation of DPSK, QPSK and QAM generation schemes
Simulation of signal constellations of BPSK, QPSK and QAM
Simulation of ASK, FSK and BPSK detection schemes
Simulation of Linear Block and Cyclic error control coding schemes
Simulation of Convolutional coding scheme
Communication link simulation

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Simulate & validate the various functional modules of a communication system
Demonstrate their knowledge in base band signaling schemes through implementation of digital modulation schemes
Apply various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance of communication system
Simulate end-to-end communication Link

LAB Requirements for a Batch of 30 students (3 students per experiment):

Kits for Signal Sampling, TDM, AM, FM, PCM, DM and Line Coding Schemes
CROs/DSOs – 15 Nos, Function Generators – 15 Nos.
MATLAB or equivalent software package for simulation experiments
PCs - 15 Nos

EC8563	COMMUNICATION NETWORKS LABORATORY	L	T	P	C
		0	0	2	4

OBJECTIVES:

The student should be made to:

Learn to communicate between two desktop computers
Learn to implement the different protocols
Be familiar with IP Configuration
Be familiar with the various routing algorithms
Be familiar with simulation tools

LIST OF EXPERIMENTS:

Implementation of Error Detection / Error Correction Techniques
Implementation of Stop and Wait Protocol and sliding window
Implementation and study of Goback-N and selective repeat protocols
Implementation of High Level Data Link Control
Implementation of IP Commands such as ping, Traceroute, nslookup.
Implementation of IP address configuration.
To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
Network Topology - Star, Bus, Ring

Implementation of distance vector routing algorithm
Implementation of Link state routing algorithm
Study of Network simulator (NS) and simulation of Congestion Control Algorithms using NS
Implementation of Encryption and Decryption Algorithms using any programming language

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Communicate between two desktop computers
Implement the different protocols
Program using sockets.
Implement and compare the various routing algorithms
Use the simulation tool.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS SOFTWARE

C / Python / Java / Equivalent Compiler
MATLAB SOFTWARE (Few experiments can be practiced with MATLAB)

- Standard LAN Trainer Kits 4 Nos
- Network simulator like NS2/ NS3 / Glomosim/OPNET/ 30 Equivalent

HARDWARE

Standalone Desktops 30 Nos

EC8691 MICROPROCESSORS AND MICROCONTROLLERS LTPC
3 003

OBJECTIVES:

To understand the Architecture of 8086 microprocessor.
To learn the design aspects of I/O and Memory Interfacing circuits. To interface microprocessors with supporting chips.
To study the Architecture of 8051 microcontroller.
To design a microcontroller based system

UNIT I THE 8086 MICROPROCESSOR 9

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

UNIT II 8086 SYSTEM BUS STRUCTURE 9

8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors.

UNIT III I/O INTERFACING 9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

UNIT IV MICROCONTROLLER 9

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT V INTERFACING MICROCONTROLLER 9

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Understand and execute programs based on 8086 microprocessor. Design Memory Interfacing circuits.

Design and interface I/O circuits.

Design and implement 8051 microcontroller based systems.

TEXT BOOKS:

Yu-Cheng Liu, Glenn A.Gibson, “Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design”, Second Edition, Prentice Hall of India, 2007. (UNIT I-III)

Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, “The 8051 Microcontroller and Embedded Systems: Using Assembly and C”, Second Edition, Pearson education, 2011. (UNIT IV-V)

REFERENCES:

Doughlas V.Hall, “Microprocessors and Interfacing, Programming and Hardware”,TMH,2012

A.K.Ray,K.M.Bhurchandi, "Advanced Microprocessors and Peripherals" 3rd edition, Tata McGrawHill, 2012

EC8095 VLSI DESIGN L T P C
3 0 0 3

OBJECTIVES:

Study the fundamentals of CMOS circuits and its characteristics.

Learn the design and realization of combinational & sequential digital circuits.

Architectural choices and performance tradeoffs involved in designing and realizing the circuits in CMOS technology are discussed

Learn the different FPGA architectures and testability of VLSI circuits.

UNIT I INTRODUCTION TO MOS TRANSISTOR 9

MOS Transistor, CMOS logic, Inverter, Pass Transistor, Transmission gate, Layout Design Rules, Gate Layouts, Stick Diagrams, Long-Channel I-V Charters tics, C-V Charters tics, Non ideal I-V Effects, DC Transfer characteristics, RC Delay Model, Elmore Delay, Linear Delay Model, Logical effort, Parasitic Delay, Delay in Logic Gate, Scaling.

UNIT II COMBINATIONAL MOS LOGIC CIRCUITS 9

Circuit Families: Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass Transistor Logic, Transmission Gates, Domino, Dual Rail Domino, CPL, DCVSPG, DPL, Circuit Pitfalls.

Power: Dynamic Power, Static Power, Low Power Architecture.

UNIT III SEQUENTIAL CIRCUIT DESIGN 9

Static latches and Registers, Dynamic latches and Registers, Pulse Registers, Sense Amplifier Based Register, Pipelining, Schmitt Trigger, Monostable Sequential Circuits, Astable Sequential Circuits.

Timing Issues : Timing Classification Of Digital System, Synchronous Design.

UNIT IV DESIGN OF ARITHMETIC BUILDING BLOCKS AND SUBSYSTEM 9

Arithmetic Building Blocks: Data Paths, Adders, Multipliers, Shifters, ALUs, power and speed tradeoffs, Case Study: Design as a tradeoff.

Designing Memory and Array structures: Memory Architectures and Building Blocks, Memory Core, Memory Peripheral Circuitry.

UNIT V IMPLEMENTATION STRATEGIES AND TESTING 9

FPGA Building Block Architectures, FPGA Interconnect Routing Procedures. Design for Testability: *Ad Hoc* Testing, Scan Design, BIST, IDDQ Testing, Design for Manufacturability, Boundary Scan.

TOTAL : 45 PERIODS

OUTCOMES:

UPON COMPLETION OF THE COURSE, STUDENTS SHOULD be ABLE TO

Realize the concepts of digital building blocks using MOS transistor.
Design combinational MOS circuits and power strategies.
Design and construct Sequential Circuits and Timing systems.
Design arithmetic building blocks and memory subsystems.
Apply and implement FPGA design flow and testing.

TEXT BOOKS:

Neil H.E. Weste, David Money Harris “CMOS VLSI Design: A Circuits and Systems Perspective”, 4th Edition, Pearson , 2017 (UNIT I,II,V)
Jan M. Rabaey ,Anantha Chandrakasan, Borivoje. Nikolic, ”Digital Integrated Circuits:A Design perspective”, Second Edition , Pearson , 2016.(UNIT III,IV)

REFERENCES

M.J. Smith, “Application Specific Integrated Circuits”, Addisson Wesley, 1997
Sung-Mo kang, Yusuf leblebici, Chulwoo Kim “CMOS Digital Integrated Circuits:Analysis & Design”,4th edition McGraw Hill Education,2013
Wayne Wolf, “Modern VLSI Design: System On Chip”, Pearson Education, 2007
R.Jacob Baker, Harry W.LI., David E.Boyee, “CMOS Circuit Design, Layout and Simulation”, Prentice Hall of India 2005.

EC8652 WIRELESS COMMUNICATION L T P C
3 0 0 3

OBJECTIVES:

To study the characteristic of wireless channel
To understand the design of a cellular system
To study the various digital signaling techniques and multipath mitigation techniques
To understand the concepts of multiple antenna techniques

UNIT I WIRELESS CHANNELS 9

Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters-Coherence bandwidth – Doppler spread & Coherence time, fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

UNIT II CELLULAR ARCHITECTURE 9

Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacity-trunking & grade of service – Coverage and capacity improvement.

UNIT III DIGITAL SIGNALING FOR FADING CHANNELS 9

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT IV MULTIPATH MITIGATION TECHNIQUES 9

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver.

UNIT V MULTIPLE ANTENNA TECHNIQUES 9

MIMO systems – spatial multiplexing -System model -Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.

TOTAL: 45 PERIODS

OUTCOMES:

The student should be able to:

Characterize a wireless channel and evolve the system design specifications

Design a cellular system based on resource availability and traffic demands

Identify suitable signaling and multipath mitigation techniques for the wireless channel and system under consideration.

TEXT BOOKS:

Rappaport,T.S., —Wireless communications‖, Pearson Education, Second Edition, 2010.(UNIT I, II, IV)

Andreas.F. Molisch, —Wireless Communications‖, John Wiley – India, 2006. (UNIT III,V)

REFERENCES:

Wireless Communication –Andrea Goldsmith, Cambridge University Press, 2011

Van Nee, R. and Ramji Prasad, —OFDM for wireless multimedia communications, Artech House, 2000

David Tse and Pramod Viswanath, **—Fundamentals of Wireless Communication,** Cambridge University Press, 2005.

Upena Dalal, —Wireless Communication‖, Oxford University Press, 2009.

MG8591 **PRINCIPLES OF MANAGEMENT** **L T P C**
3 0 0 3

OBJECTIVE:

To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization .

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations, system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management, Career planning and management

UNIT IV DIRECTING 9

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication –communication and IT.

UNIT V CONTROLLING 9

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOME:

Upon completion of the course, students will be able to have clear understanding

Managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXTBOOKS:

Stephen P. Robbins & Mary Coulter, “Management”, Prentice Hall (India) Pvt. Ltd., 10th Edition, 2009.

JAF Stoner, Freeman R.E and Daniel R Gilbert “Management”, Pearson Education, 6th Edition, 2004.

REFERENCES:

Stephen A. Robbins & David A. Decenzo & Mary Coulter, “Fundamentals of Management” Pearson Education, 7th Edition, 2011.

Robert Kreitner & Mamata Mohapatra, “ Management”, Biztantra, 2008.

Harold Koontz & Heinz Weihrich “Essentials of management” Tata McGraw Hill,1998.

Tripathy PC & Reddy PN, “Principles of Management”, Tata McGraw Hill, 1999

EC8651	TRANSMISSION LINES AND RF SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To introduce the various types of transmission lines and its characteristics

To give thorough understanding about high frequency line, power and impedance measurements

To impart technical knowledge in impedance matching using smith chart

To introduce passive filters and basic knowledge of active RF components

To get acquaintance with RF system transceiver design

UNIT I TRANSMISSION LINE THEORY 9

General theory of Transmission lines - the transmission line - general solution - The infinite line - Wavelength, velocity of propagation - Waveform distortion - the distortion-less line - Loading and different methods of loading - Line not terminated in Z0 - Reflection coefficient - calculation of current, voltage, power delivered and efficiency of transmission - Input and transfer impedance - Open and short circuited lines - reflection factor and reflection loss.

UNIT II HIGH FREQUENCY TRANSMISSION LINES 9

Transmission line equations at radio frequencies - Line of Zero dissipation - Voltage and current on the dissipation-less line, Standing Waves, Nodes, Standing Wave Ratio - Input impedance of the dissipation-less line - Open and short circuited lines - Power and impedance measurement on lines - Reflection losses - Measurement of VSWR and wavelength.

UNIT III IMPEDANCE MATCHING IN HIGH FREQUENCY LINES 9

Impedance matching: Quarter wave transformer - Impedance matching by stubs - Single stub and double stub matching - Smith chart - Solutions of problems using Smith chart - Single and double stub matching using Smith chart.

UNIT IV WAVEGUIDES 9

General Wave behavior along uniform guiding structures – Transverse Electromagnetic Waves, Transverse Magnetic Waves, Transverse Electric Waves – TM and TE Waves between parallel plates. Field Equations in rectangular waveguides, TM and TE waves in rectangular waveguides, Bessel Functions, TM and TE waves in Circular waveguides.

UNIT V RF SYSTEM DESIGN CONCEPTS 9

Active RF components: Semiconductor basics in RF, bipolar junction transistors, RF field effect transistors, High electron mobility transistors Basic concepts of RF design, Mixers, Low noise amplifiers, voltage control oscillators, Power amplifiers, transducer power gain and stability considerations.

TOTAL:45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

Explain the characteristics of transmission lines and its losses

Write about the standing wave ratio and input impedance in high frequency transmission lines

Analyze impedance matching by stubs using smith charts

Analyze the characteristics of TE and TM waves

Design a RF transceiver system for wireless communication

TEXT BOOKS:

John D Ryder, “Networks, lines and fields”, 2nd Edition, Prentice Hall India, 2015. (UNIT I-IV)

Mathew M. Radmanesh, “Radio Frequency &Microwave Electronics”, Pearson Education Asia, Second Edition,2002. (UNIT V)

REFERENCES:

Reinhold Ludwig and Powel Bretchko," RF Circuit Design – Theory and Applications", Pearson Education Asia, First Edition,2001.

D. K. Misra, "Radio Frequency and Microwave Communication Circuits- Analysis and Design", John Wiley & Sons, 2004.

E.C.Jordan **and K.G. Balmain, —Electromagnetic Waves and Radiating Systems Prentice** Hall of India, 2006.

G.S.N Raju, "Electromagnetic Field Theory and Transmission Lines Pearson Education, First edition 2005.

EC8681 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY L T P C
0042

OBJECTIVES:

To Introduce ALP concepts, features and Coding methods

Write ALP for arithmetic and logical operations in 8086 and 8051 Differentiate Serial and Parallel Interface

Interface different I/Os with Microprocessors Be familiar with MASM

LIST OF EXPERIMENTS:

8086 Programs using kits and MASM

Basic arithmetic and Logical operations
Move a data block without overlap
Code conversion, decimal arithmetic and Matrix operations.
Floating point operations, string manipulations, sorting and searching
Password checking, Print RAM size and system date
Counters and Time Delay

Peripherals and Interfacing Experiments

Traffic light controller
Stepper motor control
Digital clock
Key board and Display
Printer status
Serial interface and Parallel interface
A/D and D/A interface and Waveform Generation

8051 Experiments using kits and MASM

Basic arithmetic and Logical operations
Square and Cube program, Find 2's complement of a number
Unpacked BCD to ASCII

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Write ALP Programmes for fixed and Floating Point and Arithmetic operations Interface different I/Os with processor

Generate waveforms using Microprocessors Execute Programs in 8051

Explain the difference between simulator and Emulator

LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:
HARDWARE:
8086 development kits - 30 nos
Interfacing Units - Each 10 nos
Microcontroller - 30 nos

SOFTWARE:
Intel Desktop Systems with MASM - 30 nos
8086 Assembler
8051 Cross Assembler

EC8661	VLSI DESIGN LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:
The student should be made:
To learn Hardware Descriptive Language(Verilog/VHDL)
To learn the fundamental principles of VLSI circuit design in digital and analog domain
To familiarize fusing of logical modules on FPGAs
To provide hands on design experience with professional design (EDA) platforms

LIST OF EXPERIMENTS:

Part I: Digital System Design using HDL & FPGA (24 Periods)
Design an Adder (Min 8 Bit) using HDL. Simulate it using Xilinx/Altera Software and implement by Xilinx/Altera FPGA
Design a Multiplier (4 Bit Min) using HDL. Simulate it using Xilinx/Altera Software and implement by Xilinx/Altera FPGA
Design an ALU using HDL. Simulate it using Xilinx/Altera Software and implement by Xilinx/Altera FPGA
Design a Universal Shift Register using HDL. Simulate it using Xilinx/Altera Software and implement by Xilinx/Altera FPGA
Design Finite State Machine (Moore/Mealy) using HDL. Simulate it using Xilinx/Altera Software and implement by Xilinx/Altera FPGA
Design Memories using HDL. Simulate it using Xilinx/Altera Software and implement by Xilinx/Altera FPGA

Compare pre synthesis and post synthesis simulation for experiments 1 to 6.
Requirements: Xilinx ISE/Altera Quartus/ equivalent EDA Tools along with Xilinx/Altera/equivalent FPGA Boards

Part-II Digital Circuit Design (24 Periods)
Design and simulate a CMOS inverter using digital flow
Design and simulate a CMOS Basic Gates & Flip-Flops
Design and simulate a 4-bit synchronous counter using a Flip-Flops
Manual/Automatic Layout Generation and Post Layout Extraction for experiments 7 to 9
Analyze the power, area and timing for experiments 7 to 9 by performing Pre Layout and Post Layout Simulations.

Part-III Analog Circuit Design (12 Periods)

Design and Simulate a CMOS Inverting Amplifier.

Design and Simulate basic Common Source, Common Gate and Common Drain Amplifiers.

Analyze the input impedance, output impedance, gain and bandwidth for experiments 10 and 11 by performing Schematic Simulations.

Design and simulate simple 5 transistor differential amplifier. Analyze Gain, Bandwidth and CMRR by performing Schematic Simulations.

Requirements: Cadence/Synopsis/ Mentor Graphics/Tanner/equivalent EDA Tools

TOTAL :60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Write HDL code for basic as well as advanced digital integrated circuit

Import the logic modules into FPGA Boards

Synthesize Place and Route the digital IPs

Design, Simulate and Extract the layouts of Digital & Analog IC Blocks using EDA tools

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

S.NO	EQUIPMENT	REQUIRED
1	Xilinx ISE/Altera Quartus/ equivalent EDA Tools	10 User License
2	Xilinx/Altera/equivalent FPGA Boards	10 no
3	Cadence/Synopsis/ Mentor Graphics/Tanner/equivalent EDA Tools	10 User License
4	Personal Computer	30 no

HS8581 PROFESSIONAL COMMUNICATION L T P C 0021

OBJECTIVES:

The course aims to:

Enhance the Employability and Career Skills of students Orient the students towards grooming as a professional Make them Employable Graduates

Develop their confidence and help them attend interviews successfully.

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes

TOTAL : 30 PERIODS

OUTCOMES:

At the end of the course Learners will be able to:

Make effective presentations

Participate confidently in Group Discussions.

Attend job interviews and be successful in them.

Develop adequate Soft Skills required for the workplace

Recommended Software

Open Source Software

Win English

REFERENCES:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015

E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015

Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.

Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014

S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

EC8701 ANTENNAS AND MICROWAVE ENGINEERING L TPC 3003

OBJECTIVES:

To enable the student to understand the basic principles in antenna and microwave system design

To enhance the student knowledge in the area of various antenna designs.

To enhance the student knowledge in the area of microwave components and antenna for practical applications.

UNIT I INTRODUCTION TO MICROWAVE SYSTEMS AND ANTENNAS 9

Microwave frequency bands, Physical concept of radiation, Near- and far-field regions, Fields and Power Radiated by an Antenna, Antenna Pattern Characteristics, Antenna Gain and Efficiency, Aperture Efficiency and Effective Area, Antenna Noise Temperature and G/T, Impedance matching, Friis transmission equation, Link budget and link margin, Noise Characterization of a microwave receiver.

UNIT II RADIATION MECHANISMS AND DESIGN ASPECTS 9

Radiation Mechanisms of Linear Wire and Loop antennas, Aperture antennas, Reflector antennas, Microstrip antennas and Frequency independent antennas, Design considerations and applications.

UNIT III ANTENNA ARRAYS AND APPLICATIONS 9

Two-element array, Array factor, Pattern multiplication, Uniformly spaced arrays with uniform and non-uniform excitation amplitudes, Smart antennas.

UNIT IV PASSIVE AND ACTIVE MICROWAVE DEVICES 9

Microwave Passive components: Directional Coupler, Power Divider, Magic Tee, attenuator, resonator, Principles of Microwave Semiconductor Devices: Gunn Diodes, IMPATT diodes, Schottky Barrier diodes, PIN diodes, Microwave tubes: Klystron, TWT, Magnetron.

UNIT V MICROWAVE DESIGN PRINCIPLES 9

Impedance transformation, Impedance Matching, Microwave Filter Design, RF and Microwave Amplifier Design, Microwave Power amplifier Design, Low Noise Amplifier Design, Microwave Mixer Design, Microwave Oscillator Design

TOTAL: 45 PERIODS

OUTCOMES:

The student should be able to:

Apply the basic principles and evaluate antenna parameters and link power budgets

Design and assess the performance of various antennas

Design a microwave system given the application specifications

TEXTBOOKS:

John D Krauss, Ronald J Marhefka and Ahmad S. Khan, "Antennas and Wave Propagation: Fourth Edition, Tata McGraw-Hill, 2006. (UNIT I, II, III)

David M. Pozar, "Microwave Engineering", Fourth Edition, Wiley India, 2012.(UNIT I,IV,V)

REFERENCES:

Constantine A.Balanis, “Antenna Theory Analysis and Design”, Third edition, John Wiley India Pvt Ltd., 2005.

R.E.Collin, "Foundations for Microwave Engineering", Second edition, IEEE Press, 2001

OPTICAL COMMUNICATION **L TP C**

EC8751 **3 0 0 3**

OBJECTIVES:

To study about the various optical fiber modes, configuration and transmission characteristics of optical fibers

To learn about the various optical sources, detectors and transmission techniques

To explore various idea about optical fiber measurements and various coupling techniques

To enrich the knowledge about optical communication systems and networks

UNIT I INTRODUCTION TO OPTICAL FIBERS 9

Introduction-general optical fiber communication system- basic optical laws and definitions-optical modes and configurations -mode analysis for optical propagation through fibers-modes in planar wave guide-modes in cylindrical optical fiber-transverse electric and transverse magnetic modes- fiber materials-fiber fabrication techniques-fiber optic cables-classification of optical fiber-single mode fiber-graded index fiber.

UNIT II TRANSMISSION CHARACTERISTIC OF OPTICAL FIBER 9

Attenuation-absorption --scattering losses-bending losses-core and cladding losses-signal dispersion –inter symbol interference and bandwidth-intra model dispersion-material dispersion- waveguide dispersion-polarization mode dispersion-intermodal dispersion-dispersion optimization of single mode fiber-characteristics of single mode fiber-R-I Profile-cutoff wave length-dispersion calculation-mode field diameter.

UNIT III OPTICAL SOURCES AND DETECTORS 9

Sources: Intrinsic and extrinsic material-direct and indirect band gaps-LED-LED structures-surface emitting LED-Edge emitting LED-quantum efficiency and LED power-light source materials-modulation of LED-LASER diodes-modes and threshold conditions-Rate equations-external quantum efficiency-resonant frequencies-structures and radiation patterns-single mode laser-external modulation-temperature effort.

Detectors: PIN photo detector-Avalanche photo diodes-Photo detector noise-noise sources-SNR-detector response time-Avalanche multiplication noise-temperature effects-comparisons of photo detectors.

UNIT IV OPTICAL RECEIVER, MEASUREMENTS AND COUPLING 9

Fundamental receiver operation-preamplifiers-digital signal transmission-error sources-Front end amplifiers-digital receiver performance-probability of error-receiver sensitivity-quantum limit.

Optical power measurement-attenuation measurement-dispersion measurement- Fiber Numerical Aperture Measurements- Fiber cut- off Wave length Measurements- Fiber diameter measurements-Source to Fiber Power Launching-Lensing Schemes for Coupling Management-Fiber to Fiber Joints-LED Coupling to Single Mode Fibers-Fiber Splicing-Optical Fiber connectors.

UNIT V OPTICAL COMMUNICATION SYSTEMS AND NETWORKS 9

System design consideration Point – to –Point link design –Link power budget –rise time budget, WDM –Passive DWDM Components-Elements of optical networks-SONET/SDH-Optical Interfaces-SONET/SDH Rings and Networks-High speed light wave Links-OADM configuration-Optical ETHERNET-Soliton.

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Realize basic elements in optical fibers, different modes and configurations.

Analyze the transmission characteristics associated with dispersion and polarization techniques.

Design optical sources and detectors with their use in optical communication system.

Construct fiber optic receiver systems, measurements and coupling techniques. Design optical communication systems and its networks.

TEXT BOOKS:

P Chakrabarti, "Optical Fiber Communication", McGraw Hill Education (India)Private Limited**,** 2016 (UNIT I, II, III)

Gred Keiser,"Optical Fiber Communication", McGraw Hill Education (India) Private Limited. Fifth Edition, Reprint 2013. (UNIT I, IV, V)

REFERENCES:

John M.Senior, "Optical fiber communication", Pearson Education, second edition.2007.

Rajiv Ramaswami, "Optical Networks " , Second Edition, Elsevier , 2004.

J.Gower, "Optical Communication System", Prentice Hall of India, 2001.

Govind P. Agrawal, "Fiber-optic communication systems", third edition, John Wiley & sons, 2004.

EC8791 EMBEDDED AND REAL TIME SYSTEMS L TPC 3003

OBJECTIVES:

The student should be made to:

Understand the concepts of embedded system design and analysis

Learn the architecture and programming of ARM processor

Be exposed to the basic concepts of embedded programming Learn the real time operating systems

UNIT I INTRODUCTION TO EMBEDDEDSYSTEM DESIGN 9

Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques - Designing with computing platforms – consumer electronics architecture – platform-level performance analysis.

UNIT II ARM PROCESSOR AND PERIPHERALS 9

ARM Architecture Versions – ARM Architecture – Instruction Set – Stacks and Subroutines – Features of the LPC 214X Family – Peripherals – The Timer Unit – Pulse Width Modulation Unit – UART – Block Diagram of ARM9 and ARM Cortex M3 MCU.

UNIT III EMBEDDED PROGRAMMING 9

Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

UNIT IV REAL TIME SYSTEMS 9

Structure of a Real Time System –– Estimating program run times – Task Assignment and Scheduling – Fault Tolerance Techniques – Reliability, Evaluation – Clock Synchronisation.

UNIT V PROCESSES AND OPERATING SYSTEMS 9

Introduction – Multiple tasks and multiple processes – Multirate systems- Preemptive real-time operating systems- Priority based scheduling- Interprocess communication mechanisms – Evaluating operating system performance- power optimization strategies for processes – Example Real time operating systems-POSIX-Windows CE. - Distributed embedded systems – MPSoCs and shared memory multiprocessors. – Design Example - Audio player, Engine control unit – Video accelerator.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Describe the architecture and programming of ARM processor
Outline the concepts of embedded systems
Explain the basic concepts of real time operating system design
Model real-time applications using embedded-system concepts

TEXT BOOKS:

Marilyn Wolf, “Computers as Components - Principles of Embedded Computing System Design”, Third Edition “Morgan Kaufmann Publisher (An imprint from Elsevier), 2012. (UNIT I, II, III, V)

Jane W.S.Liu,” Real Time Systems”, Pearson Education, Third Indian Reprint, 2003.(UNIT IV)

REFERENCES:

Lyla B.Das, “Embedded Systems : An Integrated Approach” Pearson Education, 2013.

Jonathan W.Valvano, “Embedded Microcomputer Systems Real Time Interfacing”, Third Edition Cengage Learning, 2012.

David. E. Simon, “An Embedded Software Primer”, 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.

Raymond J.A. Buhr, Donald L.Bailey, “An Introduction to Real-Time Systems- From Design to Networking with C/C++”, Prentice Hall, 1999.

C.M. Krishna, Kang G. Shin, “Real-Time Systems”, International Editions, Mc Graw Hill 1997

K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, Dream Tech Press, 2005.

Sriram V Iyer, Pankaj Gupta, “Embedded Real Time Systems Programming”, Tata Mc Graw Hill, 2004.

EC8702 AD HOC AND WIRELESS SENSOR NETWORKS **L T P 3 0 0 C 3**

OBJECTIVES:

The student should be made to:

Learn Ad hoc network and Sensor Network fundamentals

Understand the different routing protocols

Have an in-depth knowledge on sensor network architecture and design issues

Understand the transport layer and security issues possible in Ad hoc and Sensor networks

Have an exposure to mote programming platforms and tools

UNIT I AD HOC NETWORKS – INTRODUCTION AND ROUTING PROTOCOLS **9**

Elements of Ad hoc Wireless Networks, Issues in Ad hoc wireless networks, Example commercial applications of Ad hoc networking, Ad hoc wireless Internet, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Table Driven Routing Protocols - Destination Sequenced Distance Vector (DSDV), On–Demand Routing protocols –Ad hoc On–Demand Distance Vector Routing (AODV).

UNIT II SENSOR NETWORKS – INTRODUCTION & ARCHITECTURES **9**

Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, WSN application examples, Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Network Architecture - Sensor Network Scenarios, Transceiver Design Considerations, Optimization Goals and Figures of Merit.

UNIT III WSN NETWORKING CONCEPTS AND PROTOCOLS **9**

MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, The Mediation Device Protocol, Contention based protocols - PAMAS, Schedule based protocols – LEACH, IEEE 802.15.4 MAC protocol, Routing Protocols-Energy Efficient Routing, Challenges and Issues in Transport layer protocol.

UNIT IV SENSOR NETWORK SECURITY **9**

Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Layer wise attacks in wireless sensor networks, possible solutions for jamming, tampering, black hole attack, flooding attack. Key Distribution and Management, Secure Routing – SPINS, reliability requirements in sensor networks.

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS **9**

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms – TinyOS, nesC, CONTIKIOS, Node-level Simulators – NS2 and its extension to sensor networks, COOJA, TOSSIM, Programming beyond individual nodes – State centric programming.

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student would be able to:

Know the basics of Ad hoc networks and Wireless Sensor Networks

Apply this knowledge to identify the suitable routing algorithm based on the network and user requirement

Apply the knowledge to identify appropriate physical and MAC layer protocols

Understand the transport layer and security issues possible in Ad hoc and sensor networks.

Be familiar with the OS used in Wireless Sensor Networks and build basic modules

TEXT BOOKS:

C. Siva Ram Murthy and B. S. Manoj, “Ad Hoc Wireless Networks Architectures and Protocols”, Prentice Hall, PTR, 2004. (UNIT I)

Holger Karl , Andreas willig, “Protocol and Architecture for Wireless Sensor Networks”, John wiley publication, Jan 2006.(UNIT II-V)

REFERENCES:

Feng Zhao, Leonidas Guibas, “Wireless Sensor Networks: an information processing approach”, Elsevier publication, 2004.

Charles E. Perkins, “Ad Hoc Networking”, Addison Wesley, 2000.

I.F. Akyildiz, W. Su, Sankarasubramaniam, E. Cayirci, “Wireless sensor networks: a survey”, computer networks, Elsevier, 2002, 394 - 422.

EC8711	EMBEDDED LABORATORY	L	TP		C
		0	0	4	2

OBJECTIVES:

The student should be made to:

Learn the working of ARM processor

Understand the Building Blocks of Embedded Systems

Learn the concept of memory map and memory interface

Write programs to interface memory, I/Os with processor

Study the interrupt performance

LIST OF EXPERIMENTS:

Study of ARM evaluation system

Interfacing ADC and DAC.

Interfacing LED and PWM.

Interfacing real time clock and serial port.

Interfacing keyboard and LCD.

Interfacing EPROM and interrupt.

Mailbox.

Interrupt performance characteristics of ARM and FPGA.

Flashing of LEDS.

Interfacing stepper motor and temperature sensor.

Implementing zigbee protocol with ARM.

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Write programs in ARM for a specific Application

Interface memory, A/D and D/A convertors with ARM system

Analyze the performance of interrupt

Write program for interfacing keyboard, display, motor and sensor.

Formulate a mini project using embedded system

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS (3 students per batch)

Embedded trainer kits with ARM board 10 Nos

Embedded trainer kits suitable for wireless communication 10 Nos

Adequate quantities of Hardware, software and consumables

EC8761 ADVANCED COMMUNICATION LABORATORY L T P C 0042

OBJECTIVES:

The student should be made to:

Understand the working principle of optical sources, detector, fibers Develop understanding of simple optical communication link

Understand the measurement of BER, Pulse broadening

Understand and capture an experimental approach to digital wireless communication

Understand actual communication waveforms that will be sent and received across wireless channel

LIST OF OPTICAL EXPERIMENTS

Measurement of connector, bending and fiber attenuation losses.

Numerical Aperture and Mode Characteristics of Fibers.

DC Characteristics of LED and PIN Photo diode.

Fiber optic Analog and Digital Link Characterization - frequency response(analog), eye diagram and BER (digital)

LIST OF WIRELESS COMMUNICATION EXPERIMENTS

Wireless Channel Simulation including fading and Doppler effects

Simulation of Channel Estimation, Synchronization & Equalization techniques

Analysing Impact of Pulse Shaping and Matched Filtering using Software Defined Radios

OFDM Signal Transmission and Reception using Software Defined Radios

LIST OF MICROWAVE EXPERIMENTS

VSWR and Impedance Measurement and Impedance Matching

Characterization of Directional Couplers, Isolators, Circulators

Gunn Diode Characteristics

Microwave IC – Filter Characteristics

TOTAL: 60 PERIODS

OUTCOMES:

On completion of this lab course, the student would be able to

Analyze the performance of simple optical link by measurement of losses and Analyzing the mode characteristics of fiber

Analyze the Eye Pattern, Pulse broadening of optical fiber and the impact on BER

Estimate the Wireless Channel Characteristics and Analyze the performance of Wireless Communication System

Understand the intricacies in Microwave System design

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS 3 STUDENTS PER EXPERIMENT:

S.NO	NAME OF THE EQUIPMENT	REQUIRED
1	Trainer kit for carrying out LED and PIN diode characteristics, Digital multi meter, optical power meter	2 Nos
2	Trainer kit for determining the mode characteristics, losses in optical fiber	2 Nos
3	Trainer kit for analyzing Analog and Digital link performance, 2 Mbps PRBS Data source, 10 MHz signal generator, 20 MHz Digital storage Oscilloscope	2 Nos
4	Kit for measuring Numerical aperture and Attenuation of fiber	2 Nos
5	Advanced Optical fiber trainer kit for PC to PC communication, BER Measurement, Pulse broadening.	2 Nos
6	MM/SM Glass and plastic fiber patch chords with ST/SC/E2000 connectors	2 sets
7	LEDs with ST / SC / E2000 receptacles – 650 / 850 nm	2 sets
8	PIN PDs with ST / SC / E2000 receptacles – 650 / 850 nm	2 sets
9	Digital Communications Teaching Bundle (LabVIEW/MATLAB/Equivalent software tools)	10 Users
10	Software Define Radio Transceiver Platform with antennas and accessories	2 Nos

EC8811	PROJECT WORK	L T P C
		0 020 10

OBJECTIVES:

To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 300 PERIODS

OUTCOME:

On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

CS8392 OBJECT ORIENTED PROGRAMMING LTPC

3 003

OBJECTIVES:

To understand Object Oriented Programming concepts and basic characteristics of Java To know the principles of packages, inheritance and interfaces

To define exceptions and use I/O streams

To develop a java application with threads and generics classes To design and build simple Graphical User Interfaces

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 10

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment **-** Java Source File -Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages - JavaDoc comments.

UNIT II INHERITANCE AND INTERFACES 9

Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes, Array Lists - Strings

UNIT III EXCEPTION HANDLING AND I/O 9

Exceptions - exception hierarchy - throwing and catching exceptions - built in exceptions, creating own exception, Stack Trace Elements.

Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files

UNIT IV MULTITHREADING AND GENERIC PROGRAMMING 8

Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter thread communication, daemon threads, thread groups.

Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

UNIT V EVENT DRIVEN PROGRAMMING 9

Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes - actions - mouse events - AWT event hierarchy - Introduction to Swing – layout management - Swing Components – Text Fields , Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to:

Develop Java programs using OOP principles

Develop Java programs with the concepts inheritance and interfaces Build Java applications using exceptions and I/O streams

Develop Java applications with threads and generics classes Develop interactive Java programs using swings

TEXT BOOKS:

Herbert Schildt, “Java The complete reference”, 8th Edition, McGraw Hill Education, 2011.

Cay S. Horstmann, Gary cornell, “Core Java Volume –I Fundamentals”, 9th Edition, Prentice Hall, 2013.

REFERENCES:

Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015.

Steven Holzner, “Java 2 Black book”, Dreamtech press, 2011.

Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education, 2000.

EC8073	MEDICAL ELECTRONICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The student should be made:

To gain knowledge about the various physiological parameters both electrical and non electrical and the methods of recording and also the method of transmitting these parameters

To study about the various assist devices used in the hospitals

To gain knowledge about equipment used for physical medicine and the various recently developed diagnostic and therapeutic techniques.

UNIT I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING 9

Sources of bio medical signals, Bio-potentials, Biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, typical waveforms and signal characteristics

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT 9

pH, PO2, PCO2, Colorimeter, Blood flow meter, Cardiac output, respiratory, blood pressure, temperature and pulse measurement, Blood Cell Counters.

UNIT III ASSIST DEVICES 9

Cardiac pacemakers, DC Defibrillator, Dialyser, Ventilators, Magnetic Resonance Imaging Systems, Ultrasonic Imaging Systems.

UNIT IV PHYSICAL MEDICINE AND BIOTELEMETRY 9

Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy, Biotelemetry.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Telemedicine, Insulin Pumps, Radio pill, Endomicroscopy, Brain machine interface, Lab on a chip.

TOTAL:45 PERIODS

OUTCOMES:

On successful completion of this course, the student should be able to:

Know the human body electro- physiological parameters and recording of bio-potentials

Comprehend the non-electrical physiological parameters and their measurement – body temperature, blood pressure, pulse, blood cell count, blood flow meter etc.

Interpret the various assist devices used in the hospitals viz. pacemakers, defibrillators, dialyzers and ventilators

Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies , and bio-telemetry principles and methods

Know about recent trends in medical instrumentation

TEXT BOOK:

Leslie Cromwell, “Biomedical Instrumentation and Measurement”, Prentice Hall of India, New Delhi, 2007. (UNIT I – V)

REFERENCES:

Khandpur, R.S., “Handbook of Biomedical Instrumentation”, TATA Mc Graw-Hill, New Delhi, 2003.

John G.Webster, “Medical Instrumentation Application and Design”, 3rd Edition, Wiley India Edition, 2007

Joseph J.Carr and John M.Brown, “Introduction to Biomedical Equipment Technology”, John Wiley and Sons, New York, 2004.

CS8493 OPERATING SYSTEMS L T P C 3 003

OBJECTIVES:

To understand the basic concepts and functions of operating systems. To understand Processes and Threads

To analyze Scheduling algorithms.

To understand the concept of Deadlocks.

To analyze various memory management schemes.

To understand I/O management and File systems.

To be familiar with the basics of Linux system and Mobile OS like iOS and Android.

UNIT I OPERATING SYSTEM OVERVIEW 7

Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

UNIT II PROCESS MANAGEMENT 11

Processes - Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication; CPU Scheduling - Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT III STORAGE MANAGEMENT 9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

UNIT IV FILE SYSTEMS AND I/O SYSTEMS 9

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface - File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem, Streams, Performance.

UNIT V CASE STUDY **9**

Linux System - Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Interprocess Communication; Mobile OS - iOS and Android - Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Analyze various scheduling algorithms.

Understand deadlock, prevention and avoidance algorithms.

Compare and contrast various memory management schemes. Understand the functionality of file systems.

Perform administrative tasks on Linux Servers and compare iOS and Android Operating Systems.

TEXT BOOK :

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley and Sons Inc., 2012.

REFERENCES :

Ramaz Elmasri, A. Gil Carrick, David Levine, “Operating Systems – A Spiral Approach”, Tata McGraw Hill Edition, 2010.

Achyut S.Godbole, Atul Kahate, “ Operating Systems”, McGraw Hill Education, 2016.

Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Pearson Education, 2004.

Gary Nutt, “Operating Systems”, Third Edition, Pearson Education, 2004.

Harvey M. Deital, “Operating Systems”, Third Edition, Pearson Education, 2004.

Daniel P Bovet and Marco Cesati, “Understanding the Linux kernel”, 3rd edition, O’Reilly, 2005.

Neil Smyth, “iPhone iOS 4 Development Essentials – Xcode”, Fourth Edition, Payload media, 2011.

EC8074 ROBOTICS AND AUTOMATION

L	T	P	C
3	0	0	3

OBJECTIVES:

The student should be made:

To understand the basic concepts associated with the design, functioning, applications and social aspects of robots

To study about the electrical drive systems and sensors used in robotics for various applications

To learn about analyzing robot kinematics, dynamics through different methodologies and study various design aspects of robot arm manipulator and end-effector

To learn about various motion planning techniques and the associated control architecture To understand the implications of AI and other trending concepts of robotics

UNIT I FOUNDATION FOR BEGINNERS **9**

Introduction -- brief history, definition, anatomy, types, classification, specification and need based applications; role and need of robots for the immediate problems of the society, future of mankind and automation-ethical issues; industrial scenario local and global, case studies on mobile robot research platform and industrial serial arm manipulator

UNIT II BUILDING BLOCKS OF A ROBOT 9

Types of electric motors - DC, Servo, Stepper; specification, drives for motors - speed & direction control and circuitry, Selection criterion for actuators, direct drives, non-traditional actuators; Sensors for localization, navigation, obstacle avoidance and path planning in known and unknown environments – optical, inertial, thermal, chemical, biosensor, other common sensors; Case study on choice of sensors and actuators for maze solving robot and self driving cars

UNIT III KINEMATICS, DYNAMICS AND DESIGN OF ROBOTS & END-EFFECTORS 9

Robot kinematics - Geometric approach for 2R, 3R manipulators, homogenous transformation using D-H representation, kinematics of WMR, Lagrangian formulation for 2R robot dynamics; Mechanical design aspects of a 2R manipulator, WMR; End-effector - common types and design case study.

UNIT IV NAVIGATION, PATH PLANNING AND CONTROL ARCHITECTURE 9

Mapping & Navigation – SLAM, Path planning for serial manipulators; types of control architectures - Cartesian control, Force control and hybrid position/force control, Behaviour based control, application of Neural network, fuzzy logic, optimization algorithms for navigation problems, programming methodologies of a robot

UNIT V AI AND OTHER RESEARCH TRENDS IN ROBOTICS 9

Application of Machine learning - AI, Expert systems; Tele-robotics and Virtual Reality, Micro & Nanorobots, Unmanned vehicles, Cognitive robotics, Evolutionary robotics, Humanoids

TOTAL:45 PERIODS

OUTCOMES:

The student should be able to:

Explain the concepts of industrial robots in terms of classification, specifications and coordinate systems, along with the need and application of robots & automation

Examine different sensors and actuators for applications like maze solving and self driving cars.

Design a 2R robot & an end-effector and solve the kinematics and dynamics of motion for robots.

Explain navigation and path planning techniques along with the control architectures adopted for robot motion planning.

Describe the impact and progress in AI and other research trends in the field of robotics

TEXT BOOKS:

Saeed. B. Niku, Introduction to Robotics, Analysis, system, Applications, Pearson educations, 2002

Roland Siegwart, Illah Reza Nourbakhsh, Introduction to Autonomous Mobile Robots, MIT Press, 2011

REFERENCES:

Richard David Klafter, Thomas A. Chmielewski, Michael Negin, Robotic engineering: an integrated approach, Prentice Hall, 1989

Craig, J. J., Introduction to Robotics: Mechanics and Control, 2nd Edition, Addison-Wesley, 1989.

K.S. Fu, R.C. Gonzalez and C.S.G. Lee, Robotics: Control, Sensing, Vision and Intelligence, McGraw-Hill, 1987.

Wesley E Snyder R, Industrial Robots, Computer Interfacing and Control, Prentice Hall International Edition, 1988.

Robin Murphy, Introduction to AI Robotics, MIT Press, 2000

Ronald C. Arkin, Behavior-based Robotics, MIT Press, 1998

N. P. Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press, 2005

Stefano Nolfi, Dario Floreano, Evolutionary Robotics – The Biology, Intelligence and

Technology of Self–Organizing Machines (Intelligent Robotics and Autonomous Agents series), MIT Press, 2004.

EC8075 NANOTECHNOLOGY AND APPLICATIONS LTPC
3 0 0 3

OBJECTIVES:

To provide a broad view of the nascent field of nanoscience and nanotechnology to undergraduates

To explore the basics of nanomaterial synthesis and characterization. To introduce the applications of nanotechnology

UINI I INTRODUCTION TO NANOTECHNOLOGY 9

Basic Structure of Nanoparticles- Kinetics in Nanostructured Materials- Zero dimensional, size and shape of nanoparticles; one-dimensional and two dimensional nanostructures- clusters of metals and semiconductors, bio nano-particles.

UNIT II FABRICATION AND CHARACTERIZATION OF NANOMATERIALS 9

Types of Nanomaterials (Quantum dots, Nanoparticles, Nanocrystals, Dendrimers, Buckyballs, Nanotubes); Gas, liquid, and solid –phase synthesis of nanomaterials; Lithography techniques (Photolithography, Dip-pen and Electron beam lithography); Thin film deposition; Electrospinning. Bio-synthesis of nanomaterials.

UNIT III PROPERTIES AND MEASUREMENT OF NANOMATERIALS 9

Optical Properties: Absorption, Fluorescence, and Resonance; Methods for the measurement of nanomaterials; Microscopy measurements: SEM, TEM, AFM and STM. Confocal and TIRF imaging.

UNIT IV NANO STRUCTURES 9

Carbon Nanotubes, Fullerenes, Nanowires, Quantum Dots. Applications of nanostructures. Reinforcement in Ceramics, Drug delivery, Giant magnetoresistance, etc. Cells response to Nanostructures.

UNIT V APPLICATIONS OF NANOTECHNOLOGY 9

Nano electronics, Nano sensors, Nanotechnology in Diagnostics applications, Environmental and Agricultural Applications of nanotechnology, Nano technology for energy systems

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Describe the basic science behind the properties of materials.

Interpret the creation, characterization, and manipulation of nanoscale materials.

Comprehend the exciting applications of nanotechnology at the leading edge of scientific research

Apply their knowledge of nanotechnology to identify how they can be exploited for new applications.

TEXT BOOKS:

Springer Handbook of Nanotechnology by Bharat Bhushan 2004.(Unit I – V)

Encyclopedia of Nanotechnology - Hari Singh Nalwa 2004. (Unit I – V)

REFERENCES:

Nanomaterials, Nanotechnologies and Design: an Introduction to Engineers and Architects, D. Michael Ashby, Paulo Ferreira, Daniel L. Schodek, Butterworth-Heinemann, 2009.

Handbook of Nanophase and Nanostructured Materials (in four volumes), Eds: Z.L. Wang, Y. Liu, Z. Zhang, Kluwer Academic/Plenum Publishers, 2003.
Handbook of Nanoceramics and their Based Nanodevices (Vol. 2) Edited by Tseung-Yuen Tseng and Hari Singh Nalwa, American Scientific Publishers.

GE8074 HUMAN RIGHTS L T P C
3 0 0 3

OBJECTIVE:

To sensitize the Engineering students to various aspects of Human Rights.

UNIT I **9**

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II **9**

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III **9**

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV **9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

OUTCOME :

Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.
Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.
Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

GE8077 TOTAL QUALITY MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:

To facilitate the understanding of Quality Management principles and process.

UNIT I INTRODUCTION **9**

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product

and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.

UNIT II TQM PRINCIPLES 9

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I 9

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II 9

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM 9

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation—Documentation—Internal Audits—Registration- **ENVIRONMENTAL MANAGEMENT SYSTEM:** Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001—Benefits of EMS.

TOTAL: 45 PERIODS

OUTCOME:

The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXT BOOK:

Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, “Total Quality Management”, Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

REFERENCES:

James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.

Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.

ISO9001-2015 standards

		L	T	P	C
CS8792	**CRYPTOGRAPHY AND NETWORK SECURITY**	**3**	**0**	**0**	**3**

OBJECTIVES:

To understand Cryptography Theories, Algorithms and Systems.

To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

UNIT I INTRODUCTION 9

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography).- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

UNIT II SYMMETRIC CRYPTOGRAPHY 9

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures - Modular arithmetic-Euclid's algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS**:** SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 – Key distribution.

UNIT III PUBLIC KEY CRYPTOGRAPHY 9

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT IV MESSAGE AUTHENTICATION AND INTEGRITY 9

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509

UNIT V SECURITY PRACTICE AND SYSTEM SECURITY 9

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

TOTAL 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Understand the fundamentals of networks security, security architecture, threats and vulnerabilities

Apply the different cryptographic operations of symmetric cryptographic algorithms

Apply the different cryptographic operations of public key cryptography

Apply the various Authentication schemes to simulate different applications.

Understand various Security practices and System security standards

TEXT BOOK:

William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.

REFERENCES

C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd

BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.

Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2

EC8091 ADVANCED DIGITAL SIGNAL PROCESSING

L	T	P	C
3	0	0	3

OBJECTIVES:

To learn and understand the concepts of stationary and non-stationary random signals and analysis & characterization of discrete-time random processes

To enunciate the significance of estimation of power spectral density of random processes To introduce the principles of optimum filters such as Wiener and Kalman filters

To introduce the principles of adaptive filters and their applications to communication engineering

To introduce the concepts of multi-resolution analysis

UNIT I DISCRETE-TIME RANDOM PROCESSES 9

Random variables - ensemble averages a review, random processes - ensemble averages, autocorrelation and autocovariance matrices, ergodic random process, white noise, filtering random processes, spectral factorization, special types of random processes - AR, MA, ARMA

UNIT II SPECTRUM ESTIMATION 10

Bias and consistency, Non-parametric methods - Periodogram, modified-Periodogram - performance analysis. Bartlett's method, Welch's method, Blackman-Tukey method. Performance comparison. Parametric methods - autoregressive (AR) spectrum estimation - autocorrelation method, Prony's method, solution using Levinson Durbin recursion.

UNIT III OPTIMUM FILTERS 9

Wiener filters - FIR Wiener filter - discrete Wiener Hopf equation, Applications - filtering, linear prediction. IIR Wiener filter - causal and non-causal filters. Recursive estimators - discrete Kalman filter.

UNIT IV ADAPTIVE FILTERS 9

Principles and properties of adaptive filters - FIR adaptive filters. Adaptive algorithms - steepest descent algorithm, the LMS algorithm - convergence. Applications of adaptive filtering - noise cancellation, channel equalization.

UNIT V MULTIRESOLUTION ANALYSIS 8

Short-time Fourier transform - Heisenberg uncertainty principle. Principles of multi-resolution analysis - sub-band coding, the continuous and discrete wavelet transform - properties. Applications of wavelet transform - noise reduction, image compression.

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Articulate and apply the concepts of special random processes in practical applications

Choose appropriate spectrum estimation techniques for a given random process

Apply optimum filters appropriately for a given communication application

Apply appropriate adaptive algorithm for processing non-stationary signals

Apply and analyse wavelet transforms for signal and image processing based applications

TEXT BOOKS

Monson H. Hayes, "Statistical digital signal processing and modeling", John Wiley and Sons Inc. New York, Indian reprint 2008. (UNIT I-IV)

P. P. Vaidyanathan, "Multirate systems and filter banks", Prentice Hall Inc. 1993 (UNIT V)

REFERENCES:

John G. Proakis & Dimitris G.Manolakis, “Digital Signal Processing – Principles, Algorithms & Applications”, Fourth Edition, Pearson Education / Prentice Hall, 2007.
Sophoncles J. Orfanidis, "Optimum signal processing", McGraw Hill, 2000

EC8001	MEMS AND NEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To introduce the concepts of micro and nano electromechanical devices
To know the fabrication process of Microsystems
To know the design concepts of micro sensors and micro actuators
To introduce the concepts of quantum mechanics and nano systems

UNIT I INTRODUCTION TO MEMS AND NEMS 9

Introduction to Design of MEMS and NEMS, Overview of Nano and Microelectromechanical Systems, Applications of Micro and Nanoelectromechanical systems, Materials for MEMS and NEMS: Silicon, silicon compounds, polymers, metals.

UNIT II MEMS FABRICATION TECHNOLOGIES 9

Photolithography, Ion Implantation, Diffusion, Oxidation, CVD, Sputtering Etching techniques, Micromachining: Bulk Micromachining, Surface Micromachining, LIGA.

UNIT III MICRO SENSORS 9

MEMS Sensors: Design of Acoustic wave sensors, Vibratory gyroscope, Capacitive Pressure sensors, Case study: Piezoelectric energy harvester

UNIT IV MICRO ACTUATORS 9

Design of Actuators: Actuation using thermal forces, Actuation using shape memory Alloys, Actuation using piezoelectric crystals, Actuation using Electrostatic forces, Case Study:RF Switch.

UNIT V NANO DEVICES 9

Atomic Structures and Quantum Mechanics, Shrodinger Equation, ZnO nanorods based NEMS device: Gas sensor.

TOTAL: 45 PERIODS

OUTCOMES:

On successful completion of this course, the student should be able to:

Interpret the basics of micro/nano electromechanical systems including their applications and advantages
Recognize the use of materials in micro fabrication and describe the fabrication processes including surface micromachining, bulk micromachining and LIGA.
Analyze the key performance aspects of electromechanical transducers including sensors and actuators
Comprehend the theoretical foundations of quantum mechanics and Nano systems

REFERENCES:

Marc Madou, “Fundamentals of Microfabrication”, CRC press 1997.
Stephen D. Senturia,” Micro system Design”, Kluwer Academic Publishers,2001
Tai Ran Hsu ,”MEMS and Microsystems Design and Manufacture” ,Tata Mcraw Hill, 2002.
Chang Liu, “Foundations of MEMS”, Pearson education India limited, 2006,
Sergey Edward Lyshevski, “MEMS and NEMS: Systems, Devices, and Structures” CRC Press, 2002

EC8002	MULTIMEDIA COMPRESSION AND COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

The student should be made:

To understand the compression schemes for text, voice, image and video To understand the QoS issues in multimedia network

To know the communication protocols for multimedia networking

UNIT I AUDIO COMPRESSION **9**

Sampling and Quantization of Speech (PCM) - Adaptive differential PCM - Delta Modulation - Vector Quantization- Linear predictive coding (LPC) - Code excited Linear predictive Coding (CELP)

UNIT II IMAGE AND VIDEO COMPRESSION **9**

Graphics Interchange format- Tagged image file format-Digitized documents- Digitized pictures-JPEG-Video Encoding-Motion estimation –Overview of H.263 and MPEG-2

UNIT III TEXT COMPRESSION **7**

Static and Dynamic Huffman coding – Arithmetic coding –Lempel-Ziv coding – LZW coding

UNIT IV GUARANTEED SERVICE MODEL **10**

Best Effort service model – Scheduling and Dropping policies – Network Performance Parameters – Quality of Service and metrics – WFQ and its variants – Random Early Detection – QoS aware Routing – Admission Control – Resource Reservation – RSVP - Traffic Shaping Algorithms – Caching – Laissez Faire Approach - Possible Architectures – An Overview of QoS Architectures

UNIT V MULTIMEDIA COMMUNICATION **10**

Stream characteristics for Continuous media – Temporal Relationship – Object Stream Interactions, Media Levity, Media Synchronization – Models for Temporal Specifications – Streaming of Audio and Video – Jitter – Fixed playout and Adaptive playout – Recovering from packet loss – RTSP –– Multimedia Communication Standards – RTP/RTCP – SIP and H.263

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Design audio compression techniques

Configure Text, image and video compression techniques
Select suitable service model for specific application

Configure multimedia communication network

TEXT BOOK:

Fred Halsall, —Multimedia communication- Applications, Networks, Protocols and Standards**ll, Pearson education, 2007.**

REFERENCES

Tay Vaughan, —Multimedia Making it work , McGraw-Hill Osborne Media, 2006.

Kurose and W. Ross, —Computer Networking —A Top Down Approach, Pearson education, 3rd ed, 2005.

KR. Rao,Z S Bojkovic, D A Milovanovic, —Multimedia Communication Systems: Techniques, Standards, and Networks**ll, Pearson Education 2007**

R. Steimnetz, K. Nahrstedt, —Multimedia Computing, Communications and Applicationsll**,** Pearson Education, First ed, 1995.

Nalin K Sharda, 'Multimedia Information Networking', Prentice Hall of India, 1999

Aura Ganz, Zvi Ganz and Kitti Wongthawaravat, 'Multimedia Wireless Networks: Technologies, Standards and QoS', Prentice Hall, 2003.

Ellen Kayata Wesel, 'Wireless Multimedia Communications: Networking Video, Voice and Data', Addision Wesley, 1998

EC8003	CMOS ANALOG IC DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

To study the fundamentals of analog circuits and MOS device models

To gain knowledge on various configurations of MOS transistors and feedback concepts To study the characteristics of noise and frequency response of the amplifier

To learn the concepts of Op-Amp frequency compensation, capacitor switches and PLLs

UNIT I INTRODUCTION TO ANALOG IC DESIGN AND CURRENT MIRRORS 9

Concepts of Analog Design - General consideration of MOS devices – MOS I/V Characteristics – Second order effects – MOS device models. Basic current mirrors- Cascode current mirrors- Active current mirrors- Large and Small signal analysis- Common mode properties.

UNIT II AMPLIFIERS AND FEEDBACK 9

Basic Concepts – Common source stage- Source follower- Common gate stage- Cascode stage. Single ended and differential operation- Basic Differential pair- Common mode response- Differential pair with MOS loads- Gilbert Cell. Feedback- General Consideration of feedback circuits- Feedback topologies- Effect of loading- Effect of feedback on Noise.

UNIT III FREQUENCY RESPONSE OF AMPLIFIERS AND NOISE 9

General considerations- Miller Effect and Association of Poles with Nodes, Common source stage- Source followers- Common gate stage- Cascode stage- Differential pair. Noise- Statistical characteristics of noise- Types of noise- Representation of noise in circuits- Noise in single stage amplifiers- Noise in differential pairs- Noise Bandwidth.

UNIT IV OPERATIONAL AMPLIFIER STABILITY AND FREQUENCY 9 COMPENSATION

General Considerations- One and Two Stage Op Amps- Gain Boosting- Comparison- Common mode feedback- Input range limitations- Slew rate- Power Supply Rejection- Noise in Op Amps- General consideration of stability and frequency compensation- Multipole system- Phase margin- Frequency compensation- Compensation of two stage op Amps- Other compensation techniques.

UNIT V SWITCHED CAPACITOR CIRCUITS AND PLLS 9

General Considerations- Sampling switches- Switched Capacitor Amplifiers- Switched Capacitor Integrator- Switched Capacitor Common mode feedback. Phase Locked Loops-Simple PLL-Charge pump PLLs - Non ideal Effects in PLLs- Delay locked loops- its Applications.

TOTAL:45 PERIODS

OUTCOMES:

Upon completion of the course, student should be able to:

Realize the concepts of Analog MOS devices and current mirror circuits.
Design different configuration of Amplifiers and feedback circuits.

Analyze the characteristics of frequency response of the amplifier and its noise.

Analyze the performance of the stability and frequency compensation techniques of Op-Amp Circuits.

Construct switched capacitor circuits and PLLs

TEXT BOOK:

Behzad Razavi, "Design of Analog CMOS Integrated Circuits", Tata McGraw Hill, 2001, 33rd re-print, 2016.

REFERENCES:

Phillip Allen and Douglas Holmberg "CMOS Analog Circuit Design" Second Edition, Oxford University Press, 2004.

Paul R. Gray, Paul J. Hurst, Stephen H. Lewis, Robert G. Meyer, Analysis and Design of Analog Integrated Circuits, 5th Edition, Wiley, 2009

Grebene, "Bipolar and MOS Analog Integrated circuit design", John Wiley & sons, Inc., 2003

EC8004 WIRELESS NETWORKS L T P C
3 0 0 3

OBJECTIVES:

The student should be made:

To understand the concept about Wireless networks, protocol stack and standards To understand and analyse the network layer solutions for Wireless networks

To study about fundamentals of 3G Services, its protocols and applications
To have in depth knowledge on internetworking of WLAN and WWAN

To learn about evolution of 4G Networks, its architecture and applications

UNIT I WIRELESS LAN 9

Introduction-WLAN technologies: - IEEE802.11: System architecture, protocol architecture, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, WPAN – IEEE 802.15.4, Wireless USB, Zigbee, 6LoWPAN, WirelessHART

UNIT II MOBILE NETWORK LAYER 9

Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6-Network layer in the internet- Mobile IP session initiation protocol - mobile ad-hoc network: Routing: Destination Sequence distance vector, IoT: CoAP

UNIT III 3G OVERVIEW 9

Overview of UTMS Terrestrial Radio access network-UMTS Core network Architecture: 3GPP Architecture, User equipment, CDMA2000 overview- Radio and Network components, Network structure, Radio Network, TD-CDMA, TD – SCDMA.

UNIT IV INTERNETWORKING BETWEEN WLANS AND WWANS 9

Internetworking objectives and requirements, Schemes to connect WLANS and 3G Networks, Session Mobility, Internetworking Architecture for WLAN and GPRS, System Description, Local Multipoint Distribution Service, Multichannel Multipoint Distribution System.

UNIT V 4G & Beyond 9

Introduction – 4G vision – 4G features and challenges - Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, IMS Architecture, LTE, Advanced Broadband Wireless Access and Services, MVNO.

TOTAL:45 PERIODS

OUTCOMES:

Upon completion of the course, the student would be able to:

Conversant with the latest 3G/4G networks and its architecture

Design and implement wireless network environment for any application using latest wireless protocols and standards

Ability to select the suitable network depending on the availability and requirement

Implement different type of applications for smart phones and mobile devices with latest network strategies

TEXT BOOKS:

Jochen Schiller, ”Mobile Communications”, Second Edition, Pearson Education 2012.(Unit I,II,III)

Vijay Garg, “Wireless Communications and networking”, First Edition, Elsevier 2007.(Unit IV,V)

REFERENCES:

Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband”, Second Edition, Academic Press, 2008.

Anurag Kumar, D.Manjunath, Joy kuri, “Wireless Networking”, First Edition, Elsevier 2011.

Simon Haykin , Michael Moher, David Koilpillai, “Modern Wireless Communications”, First Edition, Pearson Education 2013

GE8075 INTELLECTUAL PROPERTY RIGHTS L T P C
3 0 0 3

OBJECTIVE:

To give an idea about IPR, registration and its enforcement.

UNIT I INTRODUCTION 9 Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights,

Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II REGISTRATION OF IPRs 10

Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad

UNIT III AGREEMENTS AND LEGISLATIONS 10

International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT IV DIGITAL PRODUCTS AND LAW **9**

Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection – Unfair Competition – Meaning and Relationship between Unfair Competition and IP Laws – Case Studies.

UNIT V ENFORCEMENT OF IPRs **7**

Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

TOTAL : 45 PERIODS

OUTCOME:

Ability to manage Intellectual Property portfolio to enhance the value of the firm.

TEXT BOOKS:

V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012

S. V. Satakar, “Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002.

REFERENCES:

Deborah E. Bouchoux, “Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets”, Cengage Learning, Third Edition, 2012.

Prabuddha Ganguli,”Intellectual Property Rights: Unleashing the Knowledge Economy”, McGraw Hill Education, 2011.

Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

EC8092	ADVANCED WIRELESS COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

To expose the students to the importance of improving capacity of wireless channel using MIMO

To enable understanding of channel impairment mitigation using space-time block and Trellis codes

To teach advanced MIMO system like layered space time codes, MU-MIMO System and MIMO-OFDM systems

UNIT I CAPACITY OF WIRELESS CHANNELS **9**

The crowded spectrum, need for high data rate, MIMO systems – Array Gain, Diversity Gain, Data Pipes, Spatial MUX, MIMO System Model. MIMO System Capacity – channel known at the TX, Channel unknown to the TX – capacity of deterministic channels, Random channels and frequency selective channels.

UNIT II RADIO WAVE PROPAGATION 9 Radio wave propagation – Macroscopic fading-free space and out door, small scale fading

Fading measurements – Direct pulse measurements, spread spectrum correlation channel sounding frequency domain channel sounding, Antenna Diversity – Diversity combining methods.

9

UNIT III SPACE TIME BLOCK CODES

Delay Diversity scheme, Alamoti space time code – Maximum likelihood decoding maximum ratio combining. Transmit diversity space time block codes for real signal constellation and complex signal constellation - decoding of STBC.

UNIT IV SPACE TIME TRELLIS CODES 9

Space time coded systems, space time code word design criteria, design of space time T C on slow fading channels, design of STTC on Fast Fading channels, performance analysis in slow and fast fading channels, effect of imperfect channel estimation and Antenna correlation on performance, comparison of STBC & STTC.

UNIT V LAYERED SPACE TIME CODES 9

LST transmitter – Horizontal and Vertical LST receiver – ML Rx, Zero forcing Rx; MMSE Rx, SIC Rx, ZF V-blast Rx- MMSE V-blast Rx, Iterative Rx - capacity of MIMO – OFDM systems – capacity of MIMO multi user systems.

TOTAL : 45 PERIODS

OUTCOMES:

The student should be able to:

Comprehend and appreciate the significance and role of this course in the present contemporary world

Apply the knowledge about the importance of MIMO in today's communication

Appreciate the various methods for improving the data rate of wireless communication system

REFERENCES:

Mohinder Jankiraman, Space-time codes and MIMO systems, Artech House, Boston, London . www.artech house.com, ISBN 1-58053-865-7-2004

Paulraj Rohit Nabar, Dhananjay Gore, Introduction of space time wireless communication systems, Cambridge University Press, 2003.

David Tse and Pramod Viswanath, —Fundamentals of Wireless Communicationl,

Sergio Verdu " Multi User Detection" Cambridge University Press, 1998

EC8071	COGNITIVE RADIO	L	T	P	C
		3	0	0	3

OBJECTIVES:

The student should be made:

To understand the evolving software defined radio and cognitive radio techniques and their essential functionalities

To study the basic architecture and standard for cognitive radio

To understand the physical, MAC and Network layer design of cognitive radio

To expose the student to evolving applications and advanced features of cognitive radio

UNIT I INTRODUCTION TO SOFTWARE-DEFINED RADIO AND COGNITIVE

RADIO 9 Evolution of Software Defined Radio and Cognitive radio: goals, benefits, definitions, architectures, relations with other radios, issues, enabling technologies, radio frequency spectrum and regulations.

UNIT II COGNITIVE RADIO ARCHITECTURE 9

Cognition cycle – orient, plan, decide and act phases, Organization, SDR as a platform for Cognitive Radio – Hardware and Software Architectures, Overview of IEEE 802.22 standard for broadband wireless access in TV bands.

UNIT III SPECTRUM SENSING AND DYNAMIC SPECTRUM ACCESS 9

Introduction – Primary user detection techniques – energy detection, feature detection, matched filtering, cooperative detection and other approaches, Fundamental Tradeoffs in spectrum sensing, Spectrum Sharing Models of Dynamic Spectrum Access - Unlicensed and Licensed Spectrum Sharing, Fundamental Limits of Cognitive Radio.

UNIT IV MAC AND NETWORK LAYER DESIGN FOR COGNITIVE RADIO 9

MAC for cognitive radios – Polling, ALOHA, slotted ALOHA, CSMA, CSMA / CA, Network layer design – routing in cognitive radios, flow control and error control techniques.

UNIT V ADVANCED TOPICS IN COGNITIVE RADIO 9

Overview of security issues in cognitive radios, auction based spectrum markets in cognitive radio networks, public safety and cognitive radio, cognitive radio for Internet of Things.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Gain knowledge on the design principles on software defined radio and cognitive radio

Develop the ability to design and implement algorithms for cognitive radio spectrum sensing and dynamic spectrum access

Build experiments and projects with real time wireless applications

Apply the knowledge of advanced features of cognitive radio for real world applications

TEXT BOOKS:

Alexander M. Wyglinski, Maziar Nekovee, Thomas Hou, “Cognitive Radio Communications and Networks”, Academic Press, Elsevier, 2010. (Unit I to IV)

Huseyin Arslan (Ed.), “Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, Springer, 2007. (Unit V)

REFERENCES:

Bruce Fette, “Cognitive Radio Technology”, Newnes, 2006.

Kwang-Cheng Chen, Ramjee Prasad, “ Cognitive Radio Networks”, John Wiley and Sons, 2009.

Ezio Biglieri, Professor Andrea J. Goldsmith, Dr Larry J. Greenstein, Narayan B. Mandayam, H. Vincent Poor, “Principles of Cognitive Radio” , Cambridge University Press, 2012.

GE8072	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the global trends and development methodologies of various types of products and services

To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems

To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification

To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics

To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends - Environmental Trends - Political/Policy Trends **- Introduction to Product Development Methodologies and Management -** Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies **-** Product Life Cycle – Product Development Planning and Management.

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9 Requirement Engineering - Types of Requirements - Requirement Engineering - traceability

Matrix and Analysis - Requirement Management - **System Design & Modeling -** Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design.

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – **Challenges in Integration of Engineering Disciplines** - Concept Screening & Evaluation - **Detailed Design -** Component Design and Verification – **Mechanical, Electronics and Software Subsystems** - High Level Design/Low Level Design of S/W Program **-** Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – **Prototyping -** Introduction to Rapid Prototyping and Rapid Manufacturing - **System Integration, Testing, Certification and Documentation**

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product Validation processes and stages - Product Testing Standards and Certification - Product Documentation - **Sustenance -**Maintenance and Repair – Enhancements - **Product EoL -** Obsolescence Management – Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product Development in Industry versus Academia –**The IPD Essentials -** Introduction to Vertical Specific Product Development processes -Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and Software Systems – Product Development Trade-offs - Intellectual Property Rights and Confidentiality – Security and Configuration Management.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Define, formulate and analyze a problem

Solve specific problems independently or as part of a team

Gain knowledge of the Innovation & Product Development process in the Business Context

Work independently as well as in teams

Manage a project from start to finish

TEXTBOOKS:

Book specially prepared by NASSCOM as per the MoU.

Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, Fifth Edition, 2011.

John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill, Eleventh Edition, 2005.

REFERENCES:

Hiriyappa B, “Corporate Strategy – Managing the Business”, Author House, 2013.

Peter F Drucker, “People and Performance”, Butterworth – Heinemann [Elsevier], Oxford, 2004.

Vinod Kumar Garg and Venkita Krishnan N K, “Enterprise Resource Planning – Concepts”, Second Edition, Prentice Hall, 2003.

Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, Seventh Edition, 2013

CS8082 MACHINE LEARNING TECHNIQUES LTPC
3 003

OBJECTIVES:

To understand the need for machine learning for various problem solving

To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning

To learn the new approaches in machine learning

To design appropriate machine learning algorithms for problem solving

UNIT I INTRODUCTION 9

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II NEURAL NETWORKS AND GENETIC ALGORITHMS 9

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III BAYESIAN AND COMPUTATIONAL LEARNING 9

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV INSTANT BASED LEARNING 9

K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

UNIT V ADVANCED LEARNING 9

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, the students will be able to

Differentiate between supervised, unsupervised, semi-supervised machine learning approaches

Apply specific supervised or unsupervised machine learning algorithm for a particular problem

Analyse and suggest the appropriate machine learning approach for the various types of problem

Design and make modifications to existing machine learning algorithms to suit an

individual application
Provide useful case studies on the advanced machine learning algorithms

TEXT BOOK:

1. Tom M. Mitchell, “Machine Learning”, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCES:

Ethem Alpaydin, “Introduction to Machine Learning (Adaptive Computation and Machine Learning)”, The MIT Press 2004.
Stephen Marsland, “Machine Learning: An Algorithmic Perspective”, CRC Press, 2009.

EC8005	ELECTRONIC PACKAGING AND TESTING	L	T	P	C
		3	0	0	3

OBJECTIVE:

To introduce and discuss various issues related to the system packaging

UNIT I OVERVIEW OF ELECTRONIC SYSTEMS PACKAGING 9

Functions of an Electronic Package, Packaging Hierarchy, IC packaging: MEMS packaging, consumer electronics packaging, medical electronics packaging, Trends, Challenges, Driving Forces on Packaging Technology, Materials for Microelectronic packaging, Packaging Material Properties, Ceramics, Polymers, and Metals in Packaging, Material for high density interconnect substrates

UNIT II ELECTRICAL ISSUES IN PACKAGING 9

Electrical Issues of Systems Packaging, Signal Distribution, Power Distribution, Electromagnetic Interference, Transmission Lines, Clock Distribution, Noise Sources, Digital and RF Issues. Design Process Electrical Design: Interconnect Capacitance, Resistance and Inductance fundamentals; Packaging roadmaps - Hybrid circuits - Resistive, Capacitive and Inductive parasitics

UNIT III CHIP PACKAGES 9

IC Assembly - Purpose, Requirements, Technologies, Wire bonding, Tape Automated Bonding, Flip Chip, Wafer Level Packaging, reliability, wafer level burn – in and test. Single chip packaging: functions, types, materials processes, properties, characteristics, trends. Multi chip packaging: types, design, comparison, trends. System – in - package (SIP); Passives: discrete, integrated, and embedded

UNIT IV PCB, SURFACE MOUNT TECHNOLOGY AND THERMAL CONSIDERATIONS 9

Printed Circuit Board: Anatomy, CAD tools for PCB design, Standard fabrication, Micro via Boards. Board Assembly: Surface Mount Technology, Through Hole Technology, Process Control and Design challenges. Thermal Management, Heat transfer fundamentals, Thermal conductivity and resistance, Conduction, convection and radiation – Cooling requirements

UNIT V TESTING 9

Reliability, Basic concepts, Environmental interactions. Thermal mismatch and fatigue – failures – thermo mechanically induced –electrically induced – chemically induced. Electrical Testing: System level electrical testing, Interconnection tests, Active Circuit Testing, Design for Testability

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Give a comprehensive introduction to the various packaging types used along with the

associated thermal, speed, signal and integrity power issues
Enable design of packages which can withstand higher temperature, vibrations and shock
Design of PCBs which minimize the EMI and operate at higher frequency
Analyze the concepts of Testing and testing methods

TEXT BOOK:

1. Tummala, Rao R., Fundamentals of Microsystems Packaging, McGraw Hill, 2001

REFERENCES:

Blackwell (Ed), The electronic packaging handbook, CRC Press, 2000.
Tummala, Rao R, Microelectronics packaging handbook, McGraw Hill, 2008.
Bosshart, Printed Circuit Boards Design and Technology, TataMcGraw Hill, 1988.
R.G. Kaduskar and V.B.Baru, Electronic Product design, Wiley India, 2011
R.S.Khandpur, Printed Circuit Board, Tata McGraw Hill, 2005
Recent literature in Electronic Packaging
Michael L. Bushnell &Vishwani D. Agrawal," Essentials of Electronic Testing for Digital, memory & Mixed signal VLSI Circuits", Kluwer Academic Publishers.2000.
M. Abramovici, M. A. Breuer, and A.D. Friedman, "Digital System Testing and Testable Design", Computer Science Press,1990

EC8006	MIXED SIGNAL IC DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

The student should be made to:

Study the mixed signal of submicron CMOS circuits
Understand the various integrated based filters and topologies
Learn the data converters architecture, modeling and signal to noise ratio
Study the integrated circuit of oscillators and PLLs

UNIT I SUBMICRON CMOS CIRCUIT DESIGN 9

Submicron CMOS: Overview and Models, CMOS process flow, Capacitors and Resistors. Digital circuit design: The MOSFET Switch, Delay Elements, An Adder. Analog Circuit Design: Biasing, Op-Amp Design, Circuit Noise.

UNIT II INTEGRATOR BASED CMOS FILTERS 9

Integrator Building Blocks- low pass filter, Active RC integrators, MOSFET-C Integrators, g_m-C integrators, Discrete time integrators. Filtering Topologies: The Bilinear transfer function, The Biquadratic transfer function, Filters using Noise shaping.

UNIT III DATA CONVERTER ARCHITECTURES 9

DAC Architectures- Resistor string, R-2R ladder Networks, Current Steering, Charge Scaling DACs, Cyclic DAC, and Pipeline DAC. ADC Architectures- Flash, Two-step flash ADC, Pipeline ADC, Integrating ADC's, Successive Approximation ADC.

UNIT IV DATA CONVERTER MODELING AND SNR 9

Sampling and Aliasing: A modeling approach, Impulse sampling, The sample and Hold, Quantization noise. Data converter SNR: An overview, Clock Jitter, Improving SNR using Averaging, Decimating filter for ADCs, Interpolating filter for DACs, Band pass and High pass sinc filters - Using feedback to improve SNR.

UNIT V OSCILLATORS AND PLL 9

LC oscillators, Voltage Controlled Oscillators. Simple PLL, Charge pumps PLLs, Non ideal effects in PLLs, Delay Locked Loops.

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, student should be able to

Apply the concepts for mixed signal MOS circuit.

Analyze the characteristics of IC based CMOS filters.
Design of various data converter architecture circuits.

Analyze the signal to noise ratio and modeling of mixed signals.
Design of oscillators and phase lock loop circuit.

REFERENCES:

CMOS Mixed Signal Circuit Design by R.Jacob Baker, Wiley India, IEEE Press, reprint 2008.

CMOS Circuit Design, Layout and Simulation by R.Jacob Baker, Wiley India, IEEE Press, Second Edition, reprint 2009.

Design of Analog CMOS Integrated Circuits by Behzad Razavi, McGraw Hill, 33rd Re-print, 2016.

GE8071 DISASTER MANAGEMENT LTPC 3003

OBJECTIVES:

To provide students an exposure to disasters, their significance and types.

To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction

To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR) To enhance awareness of institutional processes in the country and

To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes

and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9 Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

Differentiate the types of disasters, causes and their impact on environment and society

Assess vulnerability and various methods of risk reduction measures as well as mitigation.

Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.

TEXTBOOKS:

Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423

Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]

Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011

Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES:

Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005

Government of India, National Disaster Management Policy,2009.

EC8072	ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

To introduce the basic concepts of Electromagnetic Interference

To teach the importance of Electromagnetic Compatible designs

To explain the existing standards for Electromagnetic Compatibility

UNIT I EMI/EMC CONCEPTS 9

EMI-EMC definitions; Sources and Victims of EMI; Conducted and Radiated EMI Emission and Susceptibility; Case Histories; Radiation Hazards to humans.

UNIT II EMI COUPLING PRINCIPLES 9

Conducted, radiated and transient coupling; Common ground impedance coupling; Common mode and ground loop coupling; Differential mode coupling; Near field cable to cable coupling; Field to cable coupling; Power mains and Power supply coupling; Transient EMI, ESD.

UNIT III EMI CONTROL 9

Shielding; EMI Filters; Grounding; Bonding; Isolation transformer; Transient suppressors; EMI Suppression Cables.

UNIT IV EMC DESIGN FOR CIRCUITS AND PCBS **9**

Noise from Relays and Switches; Nonlinearities in Circuits; Cross talk in transmission line and cross talk control; Component selection and mounting; PCB trace impedance; Routing; Power distribution decoupling; Zoning; Grounding; VIAs; Terminations.

UNIT V EMI MEASUREMENTS AND STANDARDS **9**

Open area test site; TEM cell; EMI test shielded chamber and shielded ferrite lined anechoic chamber; Line impedance stabilization networks; EMI Rx and spectrum analyzer; Civilian standards - CISPR, FCC, IEC, EN; Military standards-MIL461E/462.

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Identify the various types and mechanisms of Electromagnetic Interference

Propose a suitable EMI mitigation technique

Describe the various EMC Standards and methods to measure them

TEXT BOOKS:

V.P.Kodali, “Engineering EMC Principles, Measurements and Technologies”, IEEE Press, Newyork, 1996.(Unit I – V)

Henry W.Ott., Noise Reduction Techniques in Electronic Systems”, A Wiley Inter Science Publications, John Wiley and Sons, Newyork, 1988. (Unit – IV)

REFERENCES:

C.R.Paul,”Introduction to Electromagnetic Compatibility” , John Wiley and Sons, Inc, 1992.

Bemhard Keiser, “Principles of Electromagnetic Compatibility”, 3rd Ed, Artech house, Norwood, 1986.

Don R. J.White Consultant Incorporate, “Handbook of EMI/EMC”, Vol I-V, 1988.

EC8007	LOW POWER SoC DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

The student should be made to:

Identify sources of power in an IC.

Understand basic principle of System on Chip design

Learn optimization of power in combinational and sequential logic machines for SoC Design

Identify suitable techniques to reduce the power dissipation and design circuits with low power dissipation.

UNIT I POWER CONSUMPTION IN CMOS **9**

Physics of power dissipation in CMOS FET devices – Hierarchy of limits of power – Sources of power consumption – Static Power Dissipation, Active Power Dissipation - Designing for Low Power, Circuit Techniques for Leakage Power Reduction - Basic principle of low power design, Logic level power optimization – Circuit level low power design.

UNIT II SYSTEM-ON-CHIP DESIGN **9**

System-on-Chip Concept, Design Principles in SoC Architecture, SoC Design Flow, Platform-based and IP based SoC Designs, Basic Concepts of Bus-Based Communication Architectures. High performance algorithms for ASICs/ SoCs as case studies – Canonic Signed Digit Arithmetic, KCM, Distributed Arithmetic, High performance digital filters for sigma-delta ADC

UNIT III POWER OPTIMIZATION OF COMBINATIONAL AND SEQUENTIAL LOGIC MACHINES FOR SOC **9**

Introduction to Standard Cell-Based Layout – Simulation - Combinational Network Delay - Logic and interconnect Design - Power Optimization - Switch Logic Networks. Introduction - Latches and Flip-Flops - Sequential Systems and Clocking Disciplines - Sequential System Design - Power Optimization - Design Validation - Sequential Testing.

UNIT IV DESIGN OF LOW POWER CIRCUITS FOR SUB SYSTEM ON A SOC **9**

Subsystem Design Principles - Combinational Shifters – Adders – ALUs – Multipliers – High Density Memory – Field Programmable Gate Arrays - Programmable Logic Arrays - Computer arithmetic techniques for low power system – low voltage low power static Random access and dynamic Random access memories, low power clock, Inter connect and layout design

UNIT V FLOOR PLANNING **9**

Floor-planning Methods – Block Placement & Channel Definition - Global Routing - switchbox Routing - Power Distribution - Clock Distributions - Floor-planning Tips - Design Validation - Off-Chip Connections – Packages, The I/O Architecture - PAD Design

TOTAL:45 PERIODS

OUTCOME:

At the end of the course, the student should be able to:

Analyze and design low-power VLSI circuits using different circuit technologies for system on chip design

TEXT BOOKS:

J.Rabaey, “Low Power Design Essentials (Integrated Circuits and Systems)”, Springer, 2009

Wayne Wolf, “Modern VLSI Design – System – on – Chip Design”, Prentice Hall, 3rd Edition, 2008.

REFERENCES:

J.B.Kuo & J.H.Lou, “Low-voltage CMOS VLSI Circuits”, Wiley, 1999.

A.Bellaowar & M.I.Elmasry,”Low power Digital VLSI Design, Circuits and Systems”, Kluwer, 1996.

Wayne Wolf, “Modern VLSI Design – IP based Design”, Prentice Hall, 4th Edition, 2008.

M.J.S. Smith : Application Specific Integrated Circuits, Pearson, 2003

Sudeep Pasricha and NikilDutt, On-Chip Communication Architectures System on Chip Interconnect, Elsevier, 2008

Recent literature in Low Power VLSI Circuits.

Recent literature in Design of ASICs

EC8008 PHOTONIC NETWORKS L T P C 3003

OBJECTIVES:

To enable the student to understand the importance of the backbone infrastructure for our present and future communication needs and familiarize them with the architectures and the protocol stack in use

To enable the student to understand the differences in the design of data plane and the control plane and the routing, switching and the resource allocation methods and the network management and protection methods in vogue

To expose the student to the advances in networking and switching domains and the future trends

UNIT I OPTICAL SYSTEM COMPONENTS 9

Light Propagation in optical fibers – Loss & bandwidth, System limitations, Nonlinear effects; Solitons; Optical Network Components – Couplers, Isolators & Circulators, Multiplexers & Filters, Optical Amplifiers, Switches, Wavelength Converters.

UNIT II OPTICAL NETWORK ARCHITECTURES 9

Introduction to Optical Networks; SONET / SDH, Metropolitan-Area Networks, Layered Architecture; Broadcast and Select Networks – Topologies for Broadcast Networks, Media-Access Control Protocols, Wavelength Routing Architecture.

UNIT III WAVELENGTH ROUTING NETWORKS 9

The optical layer, Optical Network Nodes, Routing and wavelength assignment, Traffic Grooming in Optical Networks, Architectural variations- Linear Light wave networks, Logically Routed Networks.

UNIT IV PACKET SWITCHING AND ACCESS NETWORKS 9

Photonic Packet Switching – OTDM, Multiplexing and Demultiplexing, Synchronization, Broadcast OTDM networks, Switch-based networks, Contention Resolution Access Networks – Network Architecture overview, Optical Access Network Architectures and OTDM networks.

UNIT V NETWORK DESIGN AND MANAGEMENT 9

Transmission System Engineering – System model, Power penalty - transmitter, receiver, Optical amplifiers, crosstalk, dispersion, Wavelength stabilization, Overall design considerations, Control and Management – Network management functions, Configuration management, Performance management, Fault management, Optical safety, Service interface.

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student would be able to:

Use the backbone infrastructure for our present and future communication needs
Analyze the architectures and the protocol stack

Compare the differences in the design of data plane, control plane, routing, switching, resource allocation methods, network management and protection methods in vogue

REFERENCES:

Rajiv Ramaswami and Kumar N. Sivarajan, “Optical Networks: A Practical Perspective”, Harcourt Asia Pte Ltd., Second Edition 2004.

C. Siva Ram Moorthy and Mohan Gurusamy, “WDM Optical Networks: Concept, Design and Algorithms”, Prentice Hall of India, Ist Edition, 2002.

P.E. Green, Jr., “Fiber Optic Networks”, Prentice Hall, NJ, 1993.

Biswanath Mukherjee, “Optical WDM Networks”, Springer Series, 2006.

EC8009	COMPRESSIVE SENSING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To present the basic theory and ideas showing when it is possible to reconstruct sparse or nearly sparse signals from undersampled data

To expose students to recent ideas in modern convex optimization allowing rapid signal recovery

To give students a sense of real time applications that might benefit from compressive sensing ideas

UNIT I INTRODUCTION TO COMPRESSED SENSING 9

Introduction; Motivation; Mathematical Background; Traditional Sampling; Traditional Compression; Conventional Data Acquisition System; Drawbacks of Transform coding; Compressed Sensing (CS).

UNIT II SPARSITY AND SIGNAL RECOVERY 9

Signal Representation; Basis vectors; Sensing matrices; Restricted Isometric Property; Coherence; Stable recovery; Number of measurements.

UNIT III RECOVERY ALGORITHMS 9

Basis Pursuit algorithm: L1 minimization; Matching pursuit: Orthogonal Matching Pursuit(OMP), Stagewise OMP, Regularized OMP, Compressive Sampling Matching Pursuit (CoSaMP); Iterative Thresholding algorithm: Hard thresholding, Soft thresholding; Model based : Model based CoSaMP, Model based HIT.

UNIT IV COMPRESSIVE SENSING FOR WSN 9

Basics of WSN; Wireless Sensor without Compressive Sensing; Wireless Sensor with Compressive Sensing; Compressive Wireless Sensing: Spatial compression in WSNs, Projections in WSNs, Compressed Sensing in WSNs.

UNIT V APPLICATIONS OF COMPRESSIVE SENSING 9

Compressed Sensing for Real-Time Energy-Efficient Compression on Wireless Body Sensor Nodes; Compressive sensing in video surveillance; An Application of Compressive Sensing for Image Fusion; Single-Pixel Imaging via Compressive Sampling.

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Appreciate the motivation and the necessity for compressed sensing technology.

Design a new algorithm or modify an existing algorithm for different application areas in wireless sensor network.

TEXT BOOKS:

Radha S, Hemalatha R, Aasha Nandhini S, “Compressive Sensing for Wireless Communication: Challenges and Opportunities”, River publication, 2016. (UNIT I-V)

Mark A. Davenport, Marco F. Duarte, Yonina C. Eldar and Gitta Kutyniok, “Introduction to Compressed Sensing,” in Compressed Sensing: Theory and Applications, Y. Eldar and G. Kutyniok, eds., Cambridge University Press, 2011 (UNIT I)

REFERENCES:

Duarte, M.F.; Davenport, M.A.; Takhar, D.; Laska, J.N.; Ting Sun; Kelly, K.F.; Baraniuk, R.G.; , "Single-Pixel Imaging via Compressive Sampling," Signal Processing Magazine, IEEE, vol.25, no.2, pp.83-91, March 2008.

Tao Wan.; Zengchang Qin.; , “An application of compressive sensing for image fusion”, CIVR '10 Proceedings of the ACM International Conference on Image and Video Retrieval, Pages 3-9.

H. Mamaghanian , N. Khaled , D. Atienza and P. Vandergheynst "Compressed sensing for real-time energy-efficient ecg compression on wireless body sensor nodes", IEEE Trans. Biomed. Eng., vol. 58, no. 9, pp.2456 -2466 2011.

Mohammadreza Balouchestani.; Kaamran Raahemifar.; and Sridhar Krishnan.;, “COMPRESSED SENSING IN WIRELESS SENSOR NETWORKS: SURVEY” , Canadian Journal on Multimedia and Wireless Networks Vol. 2, No. 1, February 2011.

EC8093	DIGITAL IMAGE PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To become familiar with digital image fundamentals

To get exposed to simple image enhancement techniques in Spatial and Frequency domain.

To learn concepts of degradation function and restoration techniques.

To study the image segmentation and representation techniques.

To become familiar with image compression and recognition methods

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.

UNIT II IMAGE ENHANCEMENT 9

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.

UNIT III IMAGE RESTORATION 9

Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering

UNIT IV IMAGE SEGMENTATION 9

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V IMAGE COMPRESSION AND RECOGNITION 9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL :45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.

Operate on images using the techniques of smoothing, sharpening and enhancement. Understand the restoration concepts and filtering techniques.

Learn the basics of segmentation, features extraction, compression and recognition methods for color models.

TEXT BOOKS:

Rafael C. Gonzalez, Richard E. Woods, 'Digital Image Processing', Pearson, Third Edition, 2010.

Anil K. Jain, 'Fundamentals of Digital Image Processing', Pearson, 2002.

REFERENCES

Kenneth R. Castleman, 'Digital Image Processing', Pearson, 2006.

Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, 'Digital Image Processing using MATLAB', Pearson Education, Inc., 2011.

D,E. Dudgeon and RM. Mersereau, 'Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.

William K. Pratt, 'Digital Image Processing', John Wiley, New York, 2002

Milan Sonka et al 'Image processing, analysis and machine vision', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999.

GE8076 PROFESSIONAL ETHICS IN ENGINEERING LTPC 3003

OBJECTIVE:

To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES 10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES 8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXT BOOKS:

Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.

Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

REFERENCES:

Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.

Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009.

John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003

Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.

World Community Service Centre, ‘ Value Education’, Vethathiri publications, Erode, 2011.

Web sources:

www.onlineethics.org
www.nspe.org
www.globalethics.org
www.ethics.org

EC8010	VIDEO ANALYTICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The student should be made:

To understand the need for video Analytics

To understand the basic configuration of video analytics

To understand the functional blocks of a video analytic system

To get exposed to the various applications of video analytics

UNIT I VIDEO ANALYTIC COMPONENTS **9**

Need for Video Analytics-Overview of video Analytics- Foreground extraction- Feature extraction-classifier - Preprocessing- edge detection- smoothening- Feature space-PCA-FLD-SIFT features

UNIT II FOREGROUND EXTRACTION **9**

Background estimation- Averaging- Gaussian Mixture Model- Optical Flow based- Image Segmentation- Region growing- Region splitting-Morphological operations- erosion-Dilation-Tracking in a multiple camera environment

UNIT III CLASSIFIERS **9**

Neural networks (back propagation) - Deep learning networks- Fuzzy Classifier- Bayesian classifier-HMM based classifier

UNIT IV VIDEO ANALYTICS FOR SECURITY **9**

Abandoned object detection- human behavioral analysis -human action recognition- perimeter security- crowd analysis and prediction of crowd congestion

UNIT V VIDEO ANALYTICS FOR BUSINESS INTELLIGENCE & TRAFFIC MONITIRING AND ASSISTANCE **9**

Customer behavior analysis - people counting- Traffic rule violation detection- traffic congestion identification for route planning- driver assistance- lane change warning

TOTAL :45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Design video analytic algorithms for security applications

Design video analytic algorithms for business intelligence

Design custom made video analytics system for the given target application

REFERENCES:

Graeme A. Jones (Editor), Nikos Paragios (Editor), Carlo S. Regazzoni (Editor) Video-Based Surveillance Systems: Computer Vision and Distributed Processing , Kluwer academic publisher, 2001

Nilanjan Dey (Editor), Amira Ashour (Editor) and Suvojit Acharjee (Editor), Applied Video Processing in Surveillance and Monitoring Systems (IGI global) 2016

3. Zhihao Chen (Author), Ye Yang (Author), Jingyu Xue (Author), Liping Ye (Author), Feng Guo (Author), The Next Generation of Video Surveillance and Video Analytics: The Unified Intelligent Video Analytics Suite, CreateSpace Independent Publishing Platform, 2014
4. Caifeng Shan (Editor), Fatih Porikli (Editor), Tao Xiang (Editor), Shaogang Gong (Editor) Video Analytics for Business Intelligence, Springer, 2012

EC8011	DSP PROCESSOR ARCHITECTURE AND PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of this course is to provide knowledge on:

Basics on Digital Signal Processors

Programmable DSP's Architecture, On-chip Peripherals and Instruction set

Programming for signal processing applications

Advanced Programmable DSP Processors

UNIT I FUNDAMENTALS OF PROGRAMMABLE DSPs **9**

Introduction to Programmable DSPs, Architectural Features of PDSPs - Multiplier and Multiplier accumulator – Modified Bus Structures and Memory access – Multiple access memory – Multi-port memory – VLIW architecture- Pipelining – Special Addressing modes in P-DSPs – On chip Peripherals, Applications of Programmable DSPs.

UNIT II

TMS320C5X PROCESSOR **9**

Architecture of C5X Processor – Addressing modes – Assembly language Instructions - Pipeline stru

UNIT III TMS320C6X PROCESSOR 9

Architecture of the C6x Processor - Instruction Set – Addressing modes, Assembler directives, On-chip peripherals, DSP Development System: DSP Starter Kit - Code Composer Studio - Support Files – Introduction to AIC23 codec and other on-board peripherals, Real-Time Programming Examples for Signals and Noise generation, Frequency analysis, Filter design.

UNIT IV ADSP PROCESSORS 9

Architecture of ADSP-21XX and ADSP-210XX series of DSP processors- Addressing modes and assembly language instructions – Application programs –Filter design, FFT calculation.

UNIT V ADVANCED PROCESSORS 9

Study of TI's advanced processors - TMS320C674x and TMS320C55x DSPs, ADSP's Blackfin and SigmaDSP Processors, NXP's DSP56Fxx Family of DSP Processors, Comparison of the features of TI, ADSP and NXP DSP family processors.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Analyze the concepts of Digital Signal Processors

Demonstrate their ability to program the DSP processor for signal processing applications

Discuss, compare and select the suitable Advanced DSP Processors for real-time signal processing applications

REFERENCES:

B. Venkataramani and M. Bhaskar, "Digital Signal Processors – Architecture, Programming and Applications" – Tata McGraw – Hill Publishing Company Limited. New Delhi, 2003.

Avtar Singh and S. Srinivasan, Digital Signal Processing – Implementations using DSP Microprocessors with Examples from TMS320C54xx, Cengage Learning India Private Limited, Delhi 2012.

Rulph Chassaing and Donald Reay, Digital Signal Processing and Applications with the C6713 and C6416 DSK, John Wiley & Sons, Inc., Publication, 2012 (Reprint).

User guides Texas Instruments, Analog Devices and NXP.

EC8094 SATELLITE COMMUNICATION L T P C 3003

OBJECTIVES:

The student should be made to:

Understand the basics of satellite orbits

Understand the satellite segment and earth segment

Analyze the various methods of satellite access

Understand the applications of satellites

Understand the basics of satellite Networks

UNIT I SATELLITE ORBITS 9

Kepler**"s Laws, Newton"s law, orbital parameters, orbital perturbations, station keeping, geo** stationary and non Geo-stationary orbits – Look Angle Determination- Limits of visibility – eclipse-Sub satellite point –Sun transit outage-Launching Procedures - launch vehicles and propulsion.

UNIT II SPACE SEGMENT 9

Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command-Transponders-The Antenna Subsystem.

UNIT III SATELLITE LINK DESIGN 9

Basic link analysis, Interference analysis, Rain induced attenuation and interference, Ionospheric characteristics, Link Design with and without frequency reuse.

UNIT IV SATELLITE ACCESS AND CODING METHODS 9

Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast, multiple access: FDMA, TDMA, CDMA, DAMA Assignment Methods, compression – encryption, Coding Schemes.

UNIT V SATELLITE APPLICATIONS 9

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. GPS Position Location Principles, Differential GPS, Direct Broadcast satellites (DBS/DTH).

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student would be able to:

Analyze the satellite orbits

Analyze the earth segment and space segment

Analyze the satellite Link design

Design various satellite applications

TEXT BOOKS:

Dennis Roddy, “Satellite Communication”, 4th Edition, Mc Graw Hill International, 2006.

Timothy,Pratt,Charles,W.Bostain,JeremyE.Allnutt,"SatelliteCommunication”,2nd Edition, Wiley Publications,2002

REFERENCES:

Wilbur L.Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, “Satellite Communication Systems Engineering”, Prentice Hall/Pearson, 2007.

N.Agarwal, “Design of Geosynchronous Space Craft”, Prentice Hall, 1986.

Bruce R. Elbert, “The Satellite Communication Applications”, Hand Book, Artech House Bostan London, 1997.

Tri T. Ha, “Digital Satellite Communication”, II nd edition, 1990.

Emanuel Fthenakis, “Manual of Satellite Communications”, Mc Graw Hill Book Co., 1984.

Robert G. Winch, “Telecommunication Trans Mission Systems”, Mc Graw-Hill Book Co., 1983.

Brian Ackroyd, “World Satellite Communication and earth station Design”, BSP professional Books, 1990.

G.B.Bleazard, “Introducing Satellite communications“, NCC Publication, 1985.

M.Richharia, “Satellite Communication Systems-Design Principles”, Macmillan 2003.

CS8086	SOFT COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To learn the basic concepts of Soft Computing

To become familiar with various techniques like neural networks, genetic algorithms and fuzzy systems.

To apply soft computing techniques to solve problems.

UNIT I INTRODUCTION TO SOFT COMPUTING 9

Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network.

UNIT II ARTIFICIAL NEURAL NETWORKS 9

Back propagation Neural Networks - Kohonen Neural Network -Learning Vector Quantization -Hamming Neural Network - Hopfield Neural Network- Bi-directional Associative Memory -Adaptive Resonance Theory Neural Networks- Support Vector Machines - Spike Neuron Models.

UNIT III FUZZY SYSTEMS 9

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations -Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures - Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.

UNIT IV GENETIC ALGORITHMS 9

Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction - Inheritance Operators - Cross Over - Inversion and Deletion -Mutation Operator - Bit-wise Operators -Convergence of Genetic Algorithm.

UNIT V HYBRID SYSTEMS 9

Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination - LR-Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture - Learning in Fuzzy BP- Inference by Fuzzy BP - Fuzzy ArtMap: A Brief Introduction - Soft Computing Tools - GA in Fuzzy Logic Controller Design - Fuzzy Logic Controller

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the students should be able to

Apply suitable soft computing techniques for various applications.

Integrate various soft computing techniques for complex problems.

TEXT BOOKS:

N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.

S.N.Sivanandam , S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt.Ltd., 2nd Edition, 2011.

S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt.Ltd., 2017.

REFERENCES:

Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2002.

Kwang H.Lee, “First course on Fuzzy Theory and Applications”, Springer, 2005.
George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1996.
James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Addison Wesley, 2003.

IT8006	PRINCIPLES OF SPEECH PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The student should be made:

To understand the speech production mechanism and the various speech analysis techniques and speech models

To understand the speech compression techniques

To understand the speech recognition techniques

To know the speaker recognition and text to speech synthesis techniques

UNIT I SPEECH SIGNAL CHARACTERISTICS & ANALYSIS **11**

Speech production process - speech sounds and features- - Phonetic Representation of Speech -- representing= speech in time and frequency domains - Short-Time Analysis of Speech - Short-Time Energy and Zero-Crossing Rate - Short-Time Autocorrelation Function - Short-Time Fourier Transform (STFT) - Speech Spectrum - Cepstrum - Mel-Frequency Cepstrum Coefficients - Hearing and Auditory Perception - Perception of Loudness - Critical Bands - Pitch Perception

UNIT II SPEECH COMPRESSION **12**

Sampling and Quantization of Speech (PCM) - Adaptive differential PCM - Delta Modulation - Vector Quantization- Linear predictive coding (LPC) - Code excited Linear predictive Coding (CELP)

UNIT III SPEECH RECOGNITION **12**

LPC for speech recognition- Hidden Markov Model (HMM)- training procedure for HMM- subword unit model based on HMM- language models for large vocabulary speech recognition - Overall recognition system based on subword units - Context dependent subword units- Semantic post processor for speech recognition

UNIT IV SPEAKER RECOGNITION **5**

Acoustic parameters for speaker verification- Feature space for speaker recognition-similarity measures- Text dependent speaker verification-Text independent speaker verification techniques

UNIT V SPEAKER RECOGNITION AND TEXT TO SPEECH SYNTHESIS **5**

Text to speech synthesis(TTS)-Concatenative and waveform synthesis methods, sub-word units for TTS, intelligibility and naturalness-role of prosody

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Design speech compression techniques

Configure speech recognition techniques

Design speaker recognition systems

Design text to speech synthesis systems

TEXT BOOKS:

1. L. R. Rabiner and R. W. Schafer, Introduction to Digital Signal Processing, Foundations and Trendsin Signal Processing Vol. 1, Nos. 1–2 (2007) 1–194

Ben Gold and Nelson Morgan “Speech and Audio signal processing- processing and perception of speech and music”, John Wiley and sons 2006

REFERENCES

Lawrence Rabiner, Biiing and– Hwang Juang and B.Yegnanarayana “Fundamentals of Speech Recognition”, Pearson Education, 2009

Claudio Becchetti and Lucio Prina Ricotti, “Speech Recognition”, John Wiley and Sons, 1999

Donglos O shanhnessy “Speech Communication: Human and Machine “, 2nd Ed. University press 2001.

GE8073 FUNDAMENTALS OF NANOSCIENCE LTPC 3003

OBJECTIVE:

To learn about basis of nanomaterial science, preparation method, types and application

UNIT I INTRODUCTION 8

Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thin films-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II GENERAL METHODS OF PREPARATION 9

Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III NANOMATERIALS 12

Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications-Nanometal oxides-ZnO, TiO2,MgO, ZrO2, NiO, Nano alumina, CaO, AgTiO2, Ferrites, Nano clays-functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

UNIT IV CHARACTERIZATION TECHNIQUES 9

X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques-AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation.

UNIT V APPLICATIONS 7

Nano InfoTech: Information storage- Nano computer, molecular switch, super chip, nanocrystal, Nano biotechnology: nanoprobes in medical diagnostics and biotechnology, Nano medicines, Targeted drug delivery, Bioimaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nano sensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sun barrier products - In Photostat, printing, solar cell, battery.

TOTAL : 45 PERIODS

OUTCOMES:

Will familiarize about the science of nanomaterials

Will demonstrate the preparation of nanomaterials

Will develop knowledge in characteristic nanomaterial

TEXT BOOKS:

A.S. Edelstein and R.C. Cammearata, eds., “Nanomaterials: Synthesis, Properties and Applications”, Institute of Physics Publishing, Bristol and Philadelphia, 1996.

N John Dinardo, “Nanoscale Characterization of surfaces & Interfaces”, 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000.

REFERENCES:

G Timp, “Nanotechnology”, AIP press/Springer, 1999.

Akhlesh Lakhtakia,“The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations”. Prentice-Hall of India (P) Ltd, New Delhi, 2007.

ANNA UNIVERSITY,
CHENNAI
NON-AUTONOMOUS COLLEGES AFFILIATED TO ANNA UNIVERSITY B. E. MECHANICAL ENGINEERING
REGULATION 2021
CHOICE BASED CREDIT SYSTEM
I AND II SEMESTERS (FULL TIME) CURRICULA AND SYLLABI
SEMESTER I

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER			TOTAL CONTACT	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
THEORY								
2.	HS3151	Professional English - I	HSMC	3	1	0	4	4
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3	0	0	3	3
5.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
6.	GE3151	Problem Solving and Python Programming	ESC	3	0	0	3	3
PRACTICAL								
7	GE3171	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
8	BS3171	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
			TOTAL	**15**	**2**	**8**	**25**	**21**

SEMESTER II

SL. NO.	COURSE CODE	COURSE TITLE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	HS3251	Professional English - II	HSMC	3	1	0	4	4
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	PH3251	Materials Science	BSC	3	0	0	3	3
4.	BE3251	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	3
5.	GE3251	Engineering Graphics	ESC	2	0	4	6	4
6.		NCC Credit Course Level 1*	-	2	0	0	2	2
PRACTICAL								
7.	GE3271	Engineering Practices	ESC	0	0	4	4	2
8.	BE3271	Basic Electrical and Electronics Engineering Laboratory	ESC	0	0	4	4	2
			TOTAL	**14**	**2**	**12**	**28**	**22**

Laboratory

*****NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

IP3151 INDUCTION PROGRAMME

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it everyday for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.

Discussions would be conducted in small groups of about 20 students with a faculty

mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering /Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References:
Guide to Induction program from AICTE

HS3151 PROFESSIONAL ENGLISH - I L T P C
3 1 0 4

COURSE OBJECTIVES:

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
- To use language efficiently in expressing their opinions via various media.

INTRODUCTION TO EFFECTIVE COMMUNICATION 1

- What is effective communication? (There are many interesting activities for this.)
- Why is communication critical for excellence during study, research and work?
- What are the seven C's of effective communication?
- What are key language skills?
- What is effective listening? What does it involve?
- What is effective speaking?
- What does it mean to be an excellent reader? What should you be able to do?
- What is effective writing?
- How does one develop language and communication skills?
- What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

UNIT I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 11

Listening –for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form

Speaking - Self Introduction; Introducing a friend; Conversation - politeness strategies; Telephone conversation; Leave a voicemail; Leave a message with another person; asking for information to fill details in a form.

Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails.

Writing - Writing emails / letters introducing oneself

Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags

Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II NARRATION AND SUMMATION 12

Listening - Listening to podcast, anecdotes / stories / event narration; documentaries and interviews with celebrities.

Speaking - Narrating personal experiences / events; Interviewing a celebrity; Reporting / and summarizing of documentaries / podcasts/ interviews.

Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs.

Writing - Guided writing-- Paragraph writing Short Report on an event (field trip

etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions
Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

UNIT III DESCRIPTION OF A PROCESS / PRODUCT 12

Listening - Listen to a product and process descriptions; a classroom lecture; and advertisements about a products.
Speaking – Picture description; giving instruction to use the product; Presenting a product; and Summarizing a lecture.
Reading – Reading advertisements, gadget reviews; user manuals.
Writing - Writing definitions; instructions; and Product /Process description.
Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses.
Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words)

UNIT IV CLASSIFICATION AND RECOMMENDATIONS 12

Listening – Listening to TED Talks; Scientific lectures; and educational videos.
Speaking – Small Talk; Mini presentations and making recommendations.
Reading – Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc,.)
Writing – Note-making / Note-taking (*Study skills to be taught, not tested; Writing recommendations; Transferring information from nonverbal (chart, graph etc, to verbal mode)
Grammar – Articles; Pronouns - Possessive & Relative pronouns.
Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT V EXPRESSION 12

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions.
Speaking –group discussions, Debates and Expressing opinions through Simulations & Role play.
Reading – Reading editorials; and Opinion Blogs;
Writing – Essay Writing (Descriptive or narrative).
Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences.
Vocabulary - Cause & Effect Expressions – Content vs Function words.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able

- To listen and comprehend complex academic texts

- To read and infer the denotative and connotative meanings of technical texts
- To write definitions, descriptions, narrations and essays on various topics
- To speak fluently and accurately in formal and informal communicative contexts
- To express their opinions effectively in both oral and written medium of communication

TEXT BOOKS:

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021.
   Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES :

1. Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book on Technical English By Lakshmi Narayanan, Scitech Publications (India) Pvt. Ltd.
3. English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, R S Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.

MA3151 MATRICES AND CALCULUS L T P C

3 1 0 4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT - I MATRICES 9 + 3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications: Stretching of an elastic membrane.

UNIT - II DIFFERENTIAL CALCULUS 9 + 3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications : Maxima and Minima of functions of one variable.

UNIT - III FUNCTIONS OF SEVERAL VARIABLES 9 + 3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT - IV INTEGRAL CALCULUS 9 + 3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications: Hydrostatic force and pressure, moments and centres of mass.

UNIT - V MULTIPLE INTEGRALS 9 + 3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications: Moments and centres of mass, moment of inertia.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Able to use differential calculus ideas on several variable functions.
- Apply different methods of integration in solving practical problems.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS:

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES:

1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
2. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan. S. and Manicavachagom Pillai. T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, "Engineering Mathematics" Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus ", 14th Edition, Pearson India, 2018.

PH3151 ENGINEERING PHYSICS L T P C

3 0 0 3

COURSE OBJECTIVES

- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to be successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT I MECHANICS 9

Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

UNIT II ELECTROMAGNETIC WAVES 9

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium- vacuum interface for normal incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS 9

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection -

interference
–Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO_2 laser, semiconductor laser –Basic applications of lasers in industry.

UNIT IV BASIC QUANTUM MECHANICS 9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.

UNIT V APPLIED QUANTUM MECHANICS 9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

TOTAL : 45 PERIODS

COURSE OUTCOMES

After completion of this course, the students should be able to

- Understand the importance of mechanics.
- Express their knowledge in electromagnetic waves.
- Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
- Understand the importance of quantum physics.
- Comprehend and apply quantum mechanical principles towards the formation of energy bands.

TEXT BOOKS:

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw-Hill (Indian Edition), 2017.

REFERENCES:

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer-Verlag, 2012.

CY3151 ENGINEERING CHEMISTRY L T P C

3 0 0 3

COURSE

OBJECTIVES:

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

UNIT I WATER AND ITS TREATMENT 9

Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process.

UNIT II NANOCHEMISTRY 9

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT III PHASE RULE AND COMPOSITES 9

Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process.

Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; Power alcohol and biodiesel.

Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO_2 emission and carbon foot print.

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar

cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion-battery; Electric vehicles – working principles; Fuel cells: H_2-O_2 fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.

TOTAL: 45 PERIODS

COURSE OUTCOMES

At the end of the course, the students will be able:

- To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
- To apply the knowledge of phase rule and composites for material selection requirements.
- To recommend suitable fuels for engineering processes and applications.
- To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

GE3151	PROBLEM SOLVING AND PYTHON	L	T	P	C
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COURSE OBJECTIVES:

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.

- To do input/output with files in Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING 9

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

TOTAL : 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems.
CO2: Develop and execute simple Python programs.
CO3: Write simple Python programs using conditionals and looping for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries etc.
CO6: Read and write data from/to files in Python programs.

TEXT BOOKS:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.

2. Karl Beecher, “Computational Thinking: A Beginner's Guide to Problem Solving and programming”, 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, “Computational Thinking: A Primer for Programmers and Data Scientists”, 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data‘‘, Third Edition, MIT Press
2021
4. Eric Matthes, “Python Crash Course, A Hands - on Project Based Introduction to Programming”, 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill, 2018.

HS3251 PROFESSIONAL ENGLISH - II L T P C

3 1 0 4

COURSE OBJECTIVES

- To engage learners in meaningful language activities to improve their LSRW skills
- To enhance learners’ awareness of general rules of writing for specific audiences
- To help learners understand the purpose, audience, contexts of different types of writing
- To develop analytical thinking skills for problem solving in communicative contexts
- To demonstrate an understanding of job applications and interviews for internship and placements

UNIT I MAKING COMPARISONS 12

Listening – Evaluative Listening: Advertisements, Product Descriptions, -Audio / video; Listening and filling a Graphic Organiser (Choosing a product or service by comparison)
Speaking – Marketing a product, Persuasive Speech Techniques.
Reading - Reading advertisements, user manuals, brochures;

Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases
Vocabulary – Contextual meaning of words

UNIT II EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING 12

Listening - Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects - Speaking – Describing and discussing the reasons of accidents or disasters based on news reports.
Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint,
Writing - Writing responses to complaints.
Grammar - Active Passive Voice transformations, Infinitive and Gerunds Vocabulary – Word Formation (Noun-Verb-Adj-Adv),
Adverbs.

UNIT III PROBLEM SOLVING 12

Listening – Listening to / Watching movie scenes/ documentaries depicting a technical problem and suggesting solutions.
Speaking – Group Discussion (based on case studies), - techniques and Strategies,
Reading - Case Studies, excerpts from literary texts, news reports etc.
Writing – Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay
Grammar – Error correction; If conditional sentences
Vocabulary - Compound Words, Sentence Completion.

UNIT IV REPORTING OF EVENTS AND RESEARCH 12

Listening – Listening Comprehension based on news reports – and documentaries – Precis writing, Summarising, Speaking – Interviewing, Presenting an oral report, Mini presentations on select topics;
Reading –Newspaper articles; Writing – Recommendations, Transcoding, Accident Report, Survey Report Grammar – Reported Speech, Modals Vocabulary – Conjunctions- use of prepositions

UNIT V THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY 12

Listening – Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance);
Speaking – Participating in a Role play, (interview/telephone interview), virtual interviews,
Making presentations with visual aids;
Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses Vocabulary – Idioms.

COURSE OUTCOMES:

At the end of the course, learners will be able

- To compare and contrast products and ideas in technical texts.
- To identify cause and effects in events, industrial processes through technical texts
- To analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.
- To report events and the processes of technical and industrial nature.
- To present their opinions in a planned and logical manner, and draft effective resumes in context of job search.

TOTAL : 60 PERIOD

TEXT BOOKS

1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University.
2. English for Science & Technology Cambridge University Press 2021.Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press.

New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd.
1990, Delhi.

MA3251 STATISTICS AND NUMERICAL METHODS L T P C

3 1 0 4

COURSE OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 9+3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS 9+3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9+3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

9+3

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.
- Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

PH3251 MATERIALS SCIENCE L T P C

3 0 0 3

COURSE OBJECTIVES:

- To make the students to understand the basics of crystallography and its importance in studying materials properties.
- To understand the electrical properties of materials including free electron theory, applications of quantum mechanics and magnetic materials.
- To instil knowledge on physics of semiconductors, determination of charge carriers and device applications
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications
- To inculcate an idea of significance of nano structures, quantum confinement and ensuing nano device applications.

UNIT I CRYSTALLOGRAPHY 9

Crystal structures: BCC, FCC and HCP – directions and planes - linear and planar densities – crystal imperfections- edge and screw dislocations – grain and twin boundaries - Burgers vector and elastic strain energy- Slip systems, plastic deformation of materials - Polymorphism – phase changes – nucleation and growth – homogeneous and heterogeneous nucleation.

UNIT II ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Quantum free electron theory :Tunneling – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole. Magnetic materials: Dia, para and ferromagnetic effects – paramagnetism in the conduction electrons in metals – exchange interaction and ferromagnetism – quantum interference devices – GMR devices.

UNIT III SEMICONDUCTORS AND TRANSPORT PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts
– Schottky diode.

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain. Optical processes in quantum wells – Optoelectronic devices: light detectors and solar cells – light emitting diode – laser diode - optical processes in organic semiconductor devices –excitonic state – Electro-optics and nonlinear optics: Modulators and switching devices – plasmonics.

UNIT V NANOELECTRONIC DEVICES 9

Quantum confinement – Quantum structures – quantum wells, wires and dots – Zener-Bloch oscillations – Resonant tunneling – quantum interference effects - mesoscopic structures - Single electron phenomena – Single electron Transistor. Semiconductor photonic structures – 1D, 2D and 3D photonic crystal. Active and passive optoelectronic devices – photo processes – spintronics – carbon nanotubes: Properties and applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to

- know basics of crystallography and its importance for varied materials properties
- gain knowledge on the electrical and magnetic properties of materials and their applications
- understand clearly of semiconductor physics and functioning of semiconductor devices
- understand the optical properties of materials and working principles of various optical devices
- appreciate the importance of functional nanoelectronic devices.

TEXT BOOKS:

1. V.Raghavan. Materials Science and Engineering: A First Course, Prentice Hall India Learning Private Limited, 2015.
2. S.O. Kasap, Principles of Electronic Materials and Devices, Mc-Graw Hill, 2018.
3. Jasprit Singh, Semiconductor Devices: Basic Principles, Wiley (India), 2007.
4. Jasprit Singh, Semiconductor Optoelectronics: Physics and Technology, Mc-Graw Hill India (2019)
5. G.W.Hanson. Fundamentals of Nanoelectronics. Pearson Education (Indian Edition), 2009.

REFERENCES:

1. R.Balasubramaniam, Callister's Materials Science and Engineering. Wiley (Indian Edition), 2014.
2. Wendelin Wright and Donald Askeland, Essentials of Materials Science and Engineering, CL Engineering, 2013.
3. Robert F.Pierret, Semiconductor Device Fundamentals, Pearson, 2006
4. Pallab Bhattacharya, Semiconductor Optoelectronic Devices, Pearson, 2017
5. Ben Rogers, Jesse Adams and Sumita Pennathur, Nanotechnology: Understanding Small Systems, CRC Press, 2017.

BE3251 BASIC ELECTRICAL AND ELECTRONICS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To introduce the basics of electric circuits and analysis
- To impart knowledge in the basics of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To educate on the fundamental concepts of digital electronics
- To introduce the functional elements and working of measuring instruments

UNIT I ELECTRICAL CIRCUITS 9

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state)

Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only)

UNIT II ELECTRICAL MACHINES 9

Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.

UNIT III ANALOG ELECTRONICS

9

Resistor, Inductor and Capacitor in Electronic Circuits- Semiconductor Materials: Silicon &Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications – Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET,IGBT – Types, I-V Characteristics and Applications, Rectifier and Inverters

UNIT IV DIGITAL ELECTRONICS 9

Review of number systems, binary codes, error detection and correction codes, Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps (Simple Problems only)

UNIT V MEASUREMENTS AND INSTRUMENTATION 9

Functional elements of an instrument, Standards and calibration, Operating Principle, types -Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT, DSO- Block diagram- Data acquisition.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After completing this course, the students will be able to

1. Compute the electric circuit parameters for simple problems
2. Explain the working principle and applications of electrical machines
3. Analyze the characteristics of analog electronic devices
4. Explain the basic concepts of digital electronics
5. Explain the operating principles of measuring instruments

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020
2. S.K.Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.
3. Sedha R.S., "A textbook book of Applied Electronics", S. Chand & Co., 2008
4. James A .Svoboda, Richard C. Dorf, "Dorf's Introduction to Electric Circuits", Wiley, 2018.
5. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.

REFERENCES:

1. Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Education, 2019.
2. Thomas L. Floyd, 'Digital Fundamentals', 11th Edition, Pearson Education, 2017
3. Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th 2017.
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
5. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

GE3251 ENGINEERING GRAPHICS L T P C

0 4 4

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

1. Drawing engineering curves.
2. Drawing freehand sketch of simple objects.
3. Drawing orthographic projection of solids and section of solids.
4. Drawing development of solids
5. Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING 6+12

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 6+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.

Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6 +12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.

Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12

Principles of isometric projection — isometric scale - lsometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

Practicing three dimensional modeling of isometric projection of simple objects by CAD Software

(Not for examination)

TOTAL: (L=30; P=60) 90 PERIODS

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

- Use BIS conventions and specifications for engineering drawing.
- Construct the conic curves, involutes and cycloid.
- Solve practical problems involving projection of lines.
- Draw the orthographic, isometric and perspective projections of simple solids.
- Draw the development of simple solids.

TEXT BOOK:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

REFERENCES:

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
3. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
6. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

ANNA UNIVERSITY, CHENNAI

AFFILIATED INSTITUTIONS

B.E. MECHANICAL ENGINEERING

REGULATIONS – 2017

CHOICE BASED CREDIT SYSTEM

PROGRAMME EDUCATIONAL OBJECTIVES:

Bachelor of Mechanical Engineering curriculum is designed to impart Knowledge, Skill and Attitude on the graduates to

Have a successful career in Mechanical Engineering and allied industries.

Have expertise in the areas of Design, Thermal, Materials and Manufacturing.

Contribute towards technological development through academic research and industrial practices.

Practice their profession with good communication, leadership, ethics and social responsibility.

Graduates will adapt to evolving technologies through life-long learning.

PROGRAMME OUTCOMES

An ability to apply knowledge of mathematics and engineering sciences to develop mathematical models for industrial problems.

An ability to identify, formulates, and solve complex engineering problems. with high degree of competence.

An ability to design and conduct experiments, as well as to analyze and interpret data obtained through those experiments.

An ability to design mechanical systems, component, or a process to meet desired needs within the realistic constraints such as environmental, social, political and economic sustainability.

An ability to use modern tools, software and equipment to analyze multidisciplinary problems.

An ability to demonstrate on professional and ethical responsibilities.

An ability to communicate, write reports and express research findings in a scientific community.

An ability to adapt quickly to the global changes and contemporary practices.

An ability to engage in life-long learning.

PEO / PO Mapping

Programme Educational Objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
I	✓	✓	✓	✓	✓	✓	✓	✓	✓
II	✓	✓	✓		✓			✓	
III		✓		✓	✓	✓		✓	
IV					✓	✓	✓		✓
V		✓	✓	✓	✓				✓

		COURSE TITLE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
YEAR 1	SEM 1	CommunicativeEnglish								✓		
		Engineering Mathematics I	✓	✓	✓							✓
		Engineering Physics	✓	✓	✓							✓
		Engineering Chemistry				✓						
		Problem Solving and Python Programming					✓					
		Engineering Graphics		✓	✓					✓		
		Problem Solving and Python Programming Laboratory			✓		✓					
		Physics and Chemistry Laboratory			✓							
		COURSE TITLE	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	
	SEM 2	Technical English								✓		
		Engineering Mathematics II	✓	✓	✓					✓		✓
		Materials Science				✓					✓	
		Basic Electrical, Electronics and Instrumentation Engineering				✓					✓	
		Environmental Science and Engineering				✓						
		Engineering Mechanics	✓	✓						✓	✓	✓
		Engineering Practices Laboratory			✓							
		Basic Electrical, Electronics and Instrumentation Engineering			✓							
		COURSE TITLE	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	
YEAR 2	SEM 3	Transforms and Partial Differential Equations	✓	✓	✓						✓	✓
		Engineering Thermodynamics	✓	✓	✓					✓	✓	
		Fluid Mechanics and Machinery	✓	✓	✓							
		Manufacturing Technology - I			✓	✓	✓	✓			✓	✓
		Electrical Drives and Controls										
		Manufacturing Technology Laboratory - I			✓	✓	✓	✓			✓	✓
		Computer Aided Machine Drawing			✓	✓	✓	✓			✓	✓
		Electrical Engineering Laboratory			✓							
		Interpersonal Skills / Listening & Speaking			✓							
		COURSE TITLE	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	
	SEM 4	Statistics and Numerical Methods	✓	✓								
		Kinematics of Machinery	✓	✓	✓		✓					
		Manufacturing Technology– II	✓		✓	✓	✓				✓	✓
		Engineering Metallurgy								✓		

		Strength of Materials for Mechanical Engineers	✓	✓	✓	✓					
		Thermal Engineering- I	✓	✓			✓				
		Manufacturing Technology Laboratory–II			✓						
		Strength of Materials and Fluid Mechanics Machinery Laboratory			✓						
		Advanced Reading and Writing						✓			✓
		COURSE TITLE	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
YEAR 3	**SEM 5**	Thermal Engineering- II	✓	✓			✓			✓	
		Design of Machine Elements		✓		✓			✓	✓	✓
		Metrology and Measurements	✓		✓	✓			✓	✓	
		Dynamics of Machines	✓	✓	✓		✓		✓		✓
		Kinematics and Dynamics Laboratory	✓	✓	✓	✓					
		Thermal Engineering Laboratory	✓	✓	✓						
		Metrology and Measurements Laboratory	✓	✓	✓	✓			✓		
		COURSE TITLE	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
	SEM 6	Design of Transmission Systems		✓		✓			✓		✓
		Computer Aided Design and Manufacturing		✓	✓		✓				
		Heat and Mass Transfer	✓	✓	✓	✓				✓	✓
		Finite Element Analysis	✓	✓		✓					✓
		Hydraulics and Pneumatics	✓	✓		✓				✓	
		C.A.D. / C.A.M. Laboratory		✓	✓			✓			
		Design and Fabrication Project						✓	✓		✓
		Professional Communication				✓	✓	✓	✓		✓
		COURSE TITLE	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
YEAR 4	**SEM 7**	Power Plant Engineering	✓	✓	✓	✓				✓	
		Mechatronics	✓	✓	✓		✓			✓	✓
		Process Planning and Cost Estimation		✓		✓					
		Simulation and Analysis Laboratory	✓				✓		✓		
		Mechatronics Laboratory	✓	✓	✓		✓			✓	✓
		Technical Seminar						✓			
	SEM 8	Project Work	✓	✓	✓			✓	✓		
		Principles of Management						✓			✓

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. MECHANICAL ENGINEERING
REGULATIONS - 2017
CHOICE BASED CREDIT SYSTEM
I TO VIII SEMESTERS CURRICULA AND SYLLABI

SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY					4	0	0	4
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	MA8151	Engineering Mathematics - I	BS	4	3	0	0	3
3.	PH8151	Engineering Physics	BS	3	3	0	0	3
4.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE8151	Problem Solving and Python Programming	ES	3	2	0	4	4
6.	GE8152	Engineering Graphics	ES	6				
PRACTICALS								
7.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
8.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
			TOTAL	**31**	**19**	**0**	**12**	**25**

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY					4	0	0	4
1.	HS8251	Technical English	HS	4	4	0	0	4
2.	MA8251	Engineering Mathematics - II	BS	4	3	0	0	3
3.	PH8251	Materials Science	BS	3	3	0	0	3
4.	BE8253	Basic Electrical, Electronics and Instrumentation Engineering	ES	3	3	0	0	3
5.	GE8291	Environmental Science and Engineering	HS	3	3	2	0	4
6.	GE8292	Engineering Mechanics	ES	5				
PRACTICALS								
7.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
8.	BE8261	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	ES	4	0	0	4	2
			TOTAL	**30**	**20**	**2**	**8**	**25**

SEMESTER III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
2.	ME8391	Engineering Thermodynamics	PC	5	3	2	0	4
3.	CE8394	Fluid Mechanics and Machinery	ES	4	4	0	0	4
4.	ME8351	Manufacturing Technology - I	PC	3	3	0	0	3
5.	EE8353	Electrical Drives and Controls	ES	3	3	0	0	3
PRACTICAL								
6.	ME8361	Manufacturing Technology Laboratory - I	PC	4	0	0	4	2
7.	ME8381	Computer Aided Machine Drawing	PC	4	0	0	4	2
8.	EE8361	Electrical Engineering Laboratory	ES	4	0	0	4	2
9.	HS8381	Interpersonal Skills / Listening & Speaking	EEC	2	0	0	2	1
			TOTAL	**33**	**17**	**2**	**14**	**25**

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8452	Statistics and Numerical Methods	BS	4	4	0	0	4
2.	ME8492	Kinematics of Machinery	PC	3	3	0	0	3
3.	ME8451	Manufacturing Technology – II	PC	3	3	0	0	3
4.	ME8491	Engineering Metallurgy	PC	3	3	0	0	3
5.	CE8395	Strength of Materials for Mechanical Engineers	ES	3	3	0	0	3
6.	ME8493	Thermal Engineering- I	PC	3	3	0	0	3
PRACTICAL								
7.	ME8462	Manufacturing Technology Laboratory – II	PC	4	0	0	4	2
8.	CE8381	Strength of Materials and Fluid Mechanics and Machinery Laboratory	ES	4	0	0	4	2
9.	HS8461	Advanced Reading and Writing	EEC	2	0	0	2	1
			TOTAL	**29**	**19**	**0**	**10**	**24**

SEMESTER V

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	ME8595	Thermal Engineering- II	PC	3	3	0	0	3
2.	ME8593	Design of Machine Elements	PC	3	3	0	0	3
3.	ME8501	Metrology and Measurements	PC	3	3	0	0	3
4.	ME8594	Dynamics of Machines	PC	4	4	0	0	4
5.		Open Elective I	OE	3	3	0	0	3
PRACTICAL								
6.	ME8511	Kinematics and Dynamics Laboratory	PC	4	0	0	4	2
7.	ME8512	Thermal Engineering Laboratory	PC	4	0	0	4	2
8.	ME8513	Metrology and Measurements Laboratory	PC	4	0	0	4	2
			TOTAL	**28**	**16**	**0**	**12**	**22**

SEMESTER VI

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	ME8651	Design of Transmission Systems	PC	3	3	0	0	3
2.	ME8691	Computer Aided Design and Manufacturing	PC	3	3	0	0	3
3.	ME8693	Heat and Mass Transfer	PC	5	3	2	0	4
4.	ME8692	Finite Element Analysis	PC	3	3	0	0	3
5.	ME8694	Hydraulics and Pneumatics	PC	3	3	0	0	3
6.		Professional Elective - I	PE	3	3	0	0	3
PRACTICAL								
7.	ME8681	CAD / CAM Laboratory	PC	4	0	0	4	2
8.	ME8682	Design and Fabrication Project	EEC	4	0	0	4	2
9.	HS8581	Professional Communication	EEC	2	0	0	2	1
			TOTAL	**30**	**18**	**2**	**10**	**24**

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	ME8792	Power Plant Engineering	PC	3	3	0	0	3
2.	ME8793	Process Planning and Cost Estimation	PC	3	3	0	0	3
3.	ME8791	Mechatronics	PC	3	3	0	0	3
4.		Open Elective - II	OE	3	3	0	0	3
5.		Professional Elective – II	PE	3	3	0	0	3
6.		Professional Elective – III	PE	3	3	0	0	3
PRACTICAL								
7.	ME8711	Simulation and Analysis Laboratory	PC	4	0	0	4	2
8.	ME8781	Mechatronics Laboratory	PC	4	0	0	4	2
9.	ME8712	Technical Seminar	EEC	2	0	0	2	1
			TOTAL	**28**	**18**	**0**	**10**	**23**

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MG8591	Principles of Management	HS	3	3	0	0	3
2.		Professional Elective– IV	PE	3	3	0	0	3
PRACTICAL								
3.	ME8811	Project Work	EEC	20	0	0	20	10
			TOTAL	**29**	**9**	**0**	**20**	**16**

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 184

HUMANITIES AND SOCIAL SCIENCES (HS)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	HS8251	Technical English	HS	4	4	0	0	4
3.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
4.	MG8591	Principles of Management	HS	3	3	0	0	3

BASIC SCIENCE (BS)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA8151	Engineering Mathematics - I	BS	5	3	2	0	4
2.	PH8151	Engineering Physics	BS	3	3	0	0	3
3.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
4.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
5.	MA8251	Engineering Mathematics II	BS	4	4	0	0	4
6.	PH8251	Materials Science	BS	3	3	0	0	3
7.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
8.	MA8452	Statistics and Numerical Methods	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
2.	GE8152	Engineering Graphics	ES	6	2	0	4	4
3.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
4.	BE8253	Basic Electrical, Electronics and Instrumentation Engineering	ES	3	3	0	0	3
	GE8292	Engineering Mechanics	ES	5	3	2	0	4
	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
7.	BE8261	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	ES	4	0	0	4	2
	CE8394	Fluid Mechanics and Machinery	ES	5	3	2	0	4
	EE8353	Electrical Drives and Controls	ES	3	3	0	0	3
	EE8361	Electrical Engineering Laboratory	ES	4	0	0	4	2
11.	CE8395	Strength of Materials for Mechanical Engineers	ES	3	3	0	0	3
12.	CE8381	Strength of Materials and Fluid Mechanics and Machinery Laboratory	ES	4	0	0	4	2

PROFESSIONAL CORE (PC)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	ME8391	Engineering Thermodynamics	PC	5	3	2	0	4
2.	ME8351	Manufacturing Technology - I	PC	3	3	0	0	3
3.	ME8361	Manufacturing Technology Laboratory - I	PC	4	0	0	4	2
4.	ME8381	Computer Aided Machine Drawing	PC	4	0	0	4	2
5.	ME8492	Kinematics of Machinery	PC	3	3	0	0	3
6.	ME8451	Manufacturing Technology– II	PC	3	3	0	0	3
7.	ME8491	Engineering Metallurgy	PC	3	3	0	0	3
8.	ME8493	Thermal Engineering- I	PC	3	3	0	0	3
9.	ME8462	Manufacturing Technology Laboratory–II	PC	4	0	0	4	2
10.	ME8595	Thermal Engineering- II	PC	3	3	0	0	3
11.	ME8593	Design of Machine Elements	PC	3	3	0	0	3
12.	ME8501	Metrology and Measurements	PC	3	3	0	0	3
13.	ME8594	Dynamics of Machines	PC	4	4	0	0	4
14.	ME8511	Kinematics and Dynamics Laboratory	PC	4	0	0	4	2
15.	ME8512	Thermal Engineering Laboratory	PC	4	0	0	4	2
16.	ME8513	Metrology and Measurements Laboratory	PC	4	0	0	4	2
17.	ME8651	Design of Transmission Systems	PC	3	3	0	0	3
18.	ME8691	Computer Aided Design and Manufacturing	PC	3	3	0	0	3
19.	ME8693	Heat and Mass Transfer	PC	5	3	2	0	4
20.	ME8692	Finite Element Analysis	PC	3	3	0	0	3
21.	ME8694	Hydraulics and Pneumatics	PC	3	3	0	0	3
22.	ME8681	C.A.D. / C.A.M. Laboratory	PC	4	0	0	4	2
23.	ME8682	Design and Fabrication Project	PC	4	0	0	4	2
24.	ME8792	Power Plant Engineering	PC	3	3	0	0	3
25.	ME8791	Mechatronics	PC	3	3	0	0	3
26.	ME8793	Process Planning and Cost Estimation	PC	3	3	0	0	3
27.	ME8711	Simulation and Analysis Laboratory	PC	4	0	0	4	2
28.	ME8781	Mechatronics Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVES FOR B.E. MECHANICAL ENGINEERING

SEMESTER VI, ELECTIVE I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	ME8091	Automobile Engineering	PE	3	3	0	0	3
2.	PR8592	Welding Technology	PE	3	3	0	0	3
3.	ME8096	Gas Dynamics and Jet Propulsion	PE	3	3	0	0	3
4.	GE8075	Intellectual Property Rights	PE	3	3	0	0	3
5.	GE8073	Fundamentals of Nanoscience	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE II

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	ME8071	Refrigeration and Air conditioning	PE	3	3	0	0	3
2.	ME8072	Renewable Sources of Energy	PE	3	3	0	0	3
3.	ME8098	Quality Control and Reliability Engineering	PE	3	3	0	0	3
4.	ME8073	Unconventional Machining Processes	PE	3	3	0	0	3
5.	MG8491	Operations Research	PE	3	3	0	0	3
6.	MF8071	Additive Manufacturing	PE	3	3	0	0	3
7.	GE8077	Total Quality Management	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	ME8099	Robotics	PE	3	3	0	0	3
2.	ME8095	Design of Jigs, Fixtures and Press Tools	PE	3	3	0	0	3
3.	ME8093	Computational Fluid Dynamics	PE	3	3	0	0	3
4.	ME8097	Non Destructive Testing and Evaluation	PE	3	3	0	0	3
5.	ME8092	Composite Materials and Mechanics	PE	3	3	0	0	3
6.	GE8072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3
7.	GE8074	Human Rights	PE	3	3	0	0	3
8.	GE8071	Disaster Management	PE	3	3	0	0	3

SEMESTER VIII, ELECTIVE IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	IE8693	Production Planning and Control	PE	3	3	0	0	3
2.	MG8091	Entrepreneurship Development	PE	3	3	0	0	3
3.	ME8094	Computer Integrated Manufacturing Systems	PE	3	3	0	0	3
4.	ME8074	Vibration and Noise Control	PE	3	3	0	0	3
5.	EE8091	Micro Electro Mechanical Systems	PE	3	3	0	0	3
6.	GE8076	Professional Ethics in Engineering	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8381	Interpersonal Skills/Listening &	EEC	4	0	0	4	2
2.	ME8712	Technical Seminar	EEC	2	0	0	2	1
3.	ME8811	Project Work	EEC	20	0	0	20	12
4.	HS8461	Advanced Reading and Writing	EEC	2	0	0	2	1
5.	ME8682	Design and Fabrication Project	EEC	4	0	0	4	2
6.	HS8581	Professional Communication	EEC	2	0	0	2	1

SUMMARY

SL. NO.	SUBJECT AREA	CREDITS PER SEMESTER								CREDITS TOTAL	Percentage %
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	4	7	-	-	-		-	3	14	7.61%
2.	BS	12	7	4	4	-	-	-	-	27	14.67%
3.	ES	9	11	9	5	-	-	-	-	33	17.80%
4.	PC	-	-	11	14	19	18	13	-	74	40.22%
5.	PE	-	-	-	-	-	3	6	3	15	8.15%
6.	OE	-	-	-	-	3	-	3		6	3.26%
7.	EEC	-	-	1	1	-	3	1	10	16	7.6%
	Total	25	25	25	24	22	24	23	16	184	
Non	Credit / Mandatory										

HS8151	COMMUNICATIVE ENGLISH	L	T	P	C
		4	0	0	4

OBJECTIVES:

To develop the basic reading and writing skills of first year engineering and technology students.

To help learners develop their listening skills, which will, enable them listen to lectures and comprehend them by asking questions; seeking clarifications.

To help learners develop their speaking skills and speak fluently in real contexts.

To help learners develop vocabulary of a general kind by developing their reading skills

UNIT I SHARING INFORMATION RELATED TO ONESELF/FAMILY & FRIENDS 12

Reading- short comprehension passages, practice in skimming-scanning and predicting- Writing- completing sentences- - developing hints. Listening- short texts- short formal and informal conversations. Speaking- introducing oneself - exchanging personal information- Language development- Wh- Questions- asking and answering-yes or no questions- parts of speech. Vocabulary development-- prefixes- suffixes- articles.- count/ uncount nouns.

UNIT II GENERAL READING AND FREE WRITING 12

Reading - comprehension-pre-reading-post reading- comprehension questions (multiple choice questions and /or short questions/ open-ended questions)-inductive reading- short narratives and descriptions from newspapers including dialogues and conversations (also used as short Listening texts)- register- Writing – paragraph writing- topic sentence- main ideas- free writing, short narrative descriptions using some suggested vocabulary and structures –Listening- telephonic conversations. Speaking – sharing information of a personal kind—greeting – taking leave- Language development – prepositions, conjunctions Vocabulary development- guessing meanings of words in context.

UNIT III GRAMMAR AND LANGUAGE DEVELOPMENT 12

Reading- short texts and longer passages (close reading) Writing- understanding text structure- use of reference words and discourse markers-coherence-jumbled sentences Listening – listening to longer texts and filling up the table- product description- narratives from different sources. Speaking- asking about routine actions and expressing opinions. Language development- degrees of comparison- pronouns- direct vs indirect questions- Vocabulary development – single word substitutes- adverbs.

UNIT IV READING AND LANGUAGE DEVELOPMENT 12

Reading- comprehension-reading longer texts- reading different types of texts- magazines Writing- letter writing, informal or personal letters-e-mails-conventions of personal email- Listening- listening to dialogues or conversations and completing exercises based on them. Speaking- speaking about oneself- speaking about one,s friend- Language development- Tenses- simple present-simple past-present continuous and past continuous- Vocabulary development- synonyms-antonyms- phrasal verbs

UNIT V EXTENDED WRITING 12

Reading- longer texts- close reading –Writing- brainstorming -writing short essays – developing an outline- identifying main and subordinate ideas- dialogue writing-Listening – listening to talks-conversations- Speaking – participating in conversations- short group conversations-Language development-modal verbs- present/ past perfect tense - Vocabulary development-collocations- fixed and semi-fixed expressions

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, learners will be able to:

Read articles of a general kind in magazines and newspapers.

Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.

Comprehend conversations and short talks delivered in English

Write short essays of a general kind and personal letters and emails in English.

TEXT BOOKS:

Board of Editors. Using English A Course book for Undergraduate Engineers and Technologists. Orient BlackSwan Limited, Hyderabad: 2015

Richards, C. Jack. Interchange Students, Book-2 New Delhi: CUP, 2015.

REFERENCES

Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge,2011.

Means,L. Thomas and Elaine Langlois. English & Communication For Colleges. CengageLearning ,USA: 2007

Redston, Chris &Gillies Cunningham Face2Face (Pre-intermediate Student,s Book& Workbook) Cambridge University Press, New Delhi: 2005

Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011

Dutt P. Kiranmai and Rajeevan Geeta. Basic Communication Skills, Foundation Books: 2013

MA8151	ENGINEERING MATHEMATICS – I	L	T	P	C
		4	0	0	4

OBJECTIVES :

The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT I DIFFERENTIAL CALCULUS 12

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12

Partial differentiation – Homogeneous functions and Euler,s theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor,s series for functions of two variables – Maxima and minima of functions of two variables – Lagrange,s method of undetermined multipliers.

UNIT III INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

UNIT V DIFFERENTIAL EQUATIONS 12

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler,s and Legendre,s type – System of simultaneous linear differential equations with constant coefficients - Method of undetermined coefficients.

TOTAL : 60 PERIODS

OUTCOMES :

After completing this course, students should demonstrate competency in the following skills:

Use both the limit definition and rules of differentiation to differentiate functions.

Apply differentiation to solve maxima and minima problems.

Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.

Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.

Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.

Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.

Apply various techniques in solving differential equations.

TEXT BOOKS :

Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.

James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015. [For Units I & III - Sections 1.1, 2.2, 2.3, 2.5, 2.7(Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1(Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :

Anton, H, Bivens, I and Davis, S, "Calculus", Wiley, 10th Edition, 2016.

Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 3rd Edition, 2007.

3. Narayanan, S. and Manicavachagom Pillai, T. K., “Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.

Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.

Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016.

PH8151	ENGINEERING PHYSICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I PROPERTIES OF MATTER 9

Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT II WAVES AND FIBER OPTICS 9

Oscillatory motion – forced and damped oscillations: differential equation and its solution – plane progressive waves – wave equation. Lasers : population of energy levels, Einstein,s A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – losses associated with optical fibers - fibre optic sensors: pressure and displacement.

UNIT III THERMAL PHYSICS 9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conduction, convection and radiation – heat conductions in solids – thermal conductivity - Forbe,s and Lee,s disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT IV QUANTUM PHYSICS 9

Black body radiation – Planck,s theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger,s wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunnelling (qualitative) - scanning tunnelling microscope.

UNIT V CRYSTAL PHYSICS 9

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults – role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course,

the students will gain knowledge on the basics of properties of matter and its applications,

the students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,

the students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,

the students will get knowledge on advanced physics concepts of quantum theory and its

applications in tunneling microscopes, and

the students will understand the basics of crystals, their structures and different crystal growth techniques.

TEXT BOOKS:

Bhattacharya, D.K. & Poonam, T. “Engineering Physics”. Oxford University Press, 2015.

Gaur, R.K. & Gupta, S.L. “Engineering Physics”. Dhanpat Rai Publishers, 2012.

Pandey, B.K. & Chaturvedi, S. “Engineering Physics”. Cengage Learning India, 2012.

REFERENCES:

Halliday, D., Resnick, R. & Walker, J. “Principles of Physics”. Wiley, 2015.

Serway, R.A. & Jewett, J.W. “Physics for Scientists and Engineers”. Cengage Learning, 2010.

Tipler, P.A. & Mosca, G. “Physics for Scientists and Engineers with Modern Physics,. W.H.Freeman, 2007.

CY8151 ENGINEERING CHEMISTRY L T P C

3 0 0 3

OBJECTIVES:

To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.

To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.

Preparation, properties and applications of engineering materials.

Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT I WATER AND ITS TREATMENT 9

Hardness of water – types – expression of hardness – units – estimation of hardness of water by EDTA – numerical problems – boiler troubles (scale and sludge) – treatment of boiler feed water – Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) external treatment – Ion exchange process, zeolite process – desalination of brackish water - Reverse Osmosis.

UNIT II SURFACE CHEMISTRY AND CATALYSIS 9

Adsorption: Types of adsorption – adsorption of gases on solids – adsorption of solute from solutions – adsorption isotherms – Freundlich,s adsorption isotherm – Langmuir,s adsorption isotherm – contact theory – kinetics of surface reactions, unimolecular reactions, Langmuir - applications of adsorption on pollution abatement.

Catalysis: Catalyst – types of catalysis – criteria – autocatalysis – catalytic poisoning and catalytic promoters - acid base catalysis – applications (catalytic convertor) – enzyme catalysis– Michaelis – Menten equation.

UNIT III ALLOYS AND PHASE RULE 9

Alloys: Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Nichrome and stainless steel (18/8) – heat treatment of steel. Phase rule: Introduction, definition of terms with examples, one component system -water system - reduced phase rule - thermal analysis and cooling curves - two component systems - lead-silver system - Pattinson process.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - manufacture of synthetic petrol (Bergius process) - knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - power alcohol and biodiesel. Combustion of fuels: Introduction - calorific value - higher and lower calorific values- theoretical calculation of calorific value - ignition temperature - spontaneous ignition temperature - explosive range - flue gas analysis (ORSAT Method).

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant - breeder reactor - solar energy conversion - solar cells - wind energy. Batteries, fuel cells and supercapacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells – H_2-O_2 fuel cell.

TOTAL: 45 PERIODS

OUTCOMES:

The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

S. S. Dara and S. S. Umare, “A Textbook of Engineering Chemistry”, S. Chand & Company LTD, New Delhi, 2015

P. C. Jain and Monika Jain, “Engineering Chemistry” Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015

S. Vairam, P. Kalyani and Suba Ramesh, “Engineering Chemistry”, Wiley India PVT, LTD, New Delhi, 2013.

REFERENCES:

Friedrich Emich, “Engineering Chemistry”, Scientific International PVT, LTD, New Delhi, 2014.

Prasanta Rath, “Engineering Chemistry”, Cengage Learning India PVT, LTD, Delhi, 2015.

Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, 2015.

GE8151 PROBLEM SOLVING AND PYTHON PROGRAMMING LTPC 3003

OBJECTIVES:

To know the basics of algorithmic problem solving

To read and write simple Python programs.

To develop Python programs with conditionals and loops.

To define Python functions and call them.

To use Python data structures –- lists, tuples, dictionaries.

To do input/output with files in Python.

UNIT I ALGORITHMIC PROBLEM SOLVING 9

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

OUTCOMES:

Upon completion of the course, students will be able to

Develop algorithmic solutions to simple computational problems
Read, write, execute by hand simple Python programs.
Structure simple Python programs for solving problems.
Decompose a Python program into functions.
Represent compound data using Python lists, tuples, dictionaries.
Read and write data from/to files in Python Programs.

TOTAL : 45 PERIODS

TEXT BOOKS:

Allen B. Downey, ‘‘Think Python: How to Think Like a Computer Scientist,,, 2nd edition, Updated for Python 3, Shroff/O,Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

Guido van Rossum and Fred L. Drake Jr, “An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

John V Guttag, “Introduction to Computation and Programming Using Python,,, Revised and expanded Edition, MIT Press , 2013

Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.

Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd.,, 2015.

Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.

Charles Dierbach, “Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.

Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3”, Second edition, Pragmatic Programmers, LLC, 2013.

GE8152 **ENGINEERING GRAPHICS** **L T P C**
2 0 4 4

OBJECTIVES:

To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.

To expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination) **1**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING **7+12**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE **6+12**

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS **5+12**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES **5+12**

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS **6+12**

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method .

TOTAL: 90 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

familiarize with the fundamentals and standards of Engineering graphics

perform freehand sketching of basic geometrical constructions and multiple views of objects.

project orthographic projections of lines and plane surfaces.

draw projections and solids and development of surfaces.

visualize and to project isometric and perspective sections of simple solids.

TEXT BOOK:

Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.

Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2008.

REFERENCES:

Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.

Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2007.

Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

N S Parthasarathy and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.

Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.

Publication of Bureau of Indian Standards:

IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.

IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.

IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.

IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.

IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

There will be five questions, each of either or type covering all units of the syllabus.

All questions will carry equal marks of 20 each making a total of 100.

The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.

The examination will be conducted in appropriate sessions on the same day

GE8161	**PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY**	**LTPC 0 042**

OBJECTIVES:

To write, test, and debug simple Python programs.

To implement Python programs with conditionals and loops.

Use functions for structuring Python programs.

Represent compound data using Python lists, tuples, dictionaries.

Read and write data from/to files in Python.

LIST OF PROGRAMS

Compute the GCD of two numbers.

Find the square root of a number (Newton,s method)

Exponentiation (power of a number)

Find the maximum of a list of numbers

Linear search and Binary search

Selection sort, Insertion sort

Merge sort
First n prime numbers
Multiply matrices
Programs that take command line arguments (word count)
Find the most frequent words in a text read from a file
Simulate elliptical orbits in Pygame
Simulate bouncing ball using Pygame

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

OUTCOMES:

Upon completion of the course, students will be able to

Write, test, and debug simple Python programs.
Implement Python programs with conditionals and loops.
Develop Python programs step-wise by defining functions and calling them.
Use Python lists, tuples, dictionaries for representing compound data.
Read and write data from/to files in Python.

TOTAL :60 PERIODS

BS8161	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	C
	(Common to all branches of B.E. / B.Tech Programmes)	0	0	4	2

OBJECTIVES:

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

Determination of rigidity modulus – Torsion pendulum
Determination of Young,s modulus by non-uniform bending method
(a) Determination of wavelength, and particle size using Laser
(b) Determination of acceptance angle in an optical fiber.
Determination of thermal conductivity of a bad conductor – Lee,s Disc method.
Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
Determination of wavelength of mercury spectrum – spectrometer grating
Determination of band gap of a semiconductor
Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to
apply principles of elasticity, optics and thermal properties for engineering applications.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:

To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

- To acquaint the students with the determination of molecular weight of a polymer by viscometery.

Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.

Determination of total, temporary & permanent hardness of water by EDTA method.

Determination of DO content of water sample by Winkler,s method.

Determination of chloride content of water sample by argentometric method.

Estimation of copper content of the given solution by Iodometry.

Determination of strength of given hydrochloric acid using pH meter.

Determination of strength of acids in a mixture of acids using conductivity meter.

Estimation of iron content of the given solution using potentiometer.

Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).

Estimation of sodium and potassium present in water using flame photometer.

Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

Pseudo first order kinetics-ester hydrolysis.

Corrosion experiment-weight loss method.

Determination of CMC.

Phase change in a solid.

Conductometric titration of strong acid vs strong base.

OUTCOMES:

The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

TOTAL: 30 PERIODS

TEXTBOOKS:

1. Vogel,s Textbook of Quantitative Chemical Analysis (8^{TH} edition, 2014)

HS8251	**TECHNICAL ENGLISH**	**L**	**T**	**P**	**C**
		4	**0**	**0**	**4**

OBJECTIVES:

The Course prepares second semester engineering and Technology students to:

Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.

Foster their ability to write convincing job applications and effective reports.

Develop their speaking skills to make technical presentations , participate in group discussions.

Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialisation.

UNIT I INTRODUCTION TECHNICAL ENGLISH 12

Listening- Listening to talks mostly of a scientific/technical nature and completing information-gap exercises- Speaking –Asking for and giving directions- Reading – reading short technical texts from journals- newspapers- Writing- purpose statements – extended definitions – issue- writing instructions – checklists-recommendations-Vocabulary Development- technical vocabulary Language Development –subject verb agreement - compound words.

UNIT II READING AND STUDY SKILLS 12

Listening- Listening to longer technical talks and completing exercises based on them-Speaking – describing a process-Reading – reading longer technical texts- identifying the various transitions in a text- paragraphing- Writing- interpreting cgarts, graphs- Vocabulary Development-vocabularyused in formal letters/emails and reports Language Development- impersonal passive voice, numerical adjectives.

UNIT III TECHNICAL WRITING AND GRAMMAR 12

Listening- Listening to classroom lectures/ talkls on engineering/technology -Speaking – introduction to technical presentations- Reading – longer texts both general and technical, practice in speed reading; Writing-Describing a process, use of sequence words- Vocabulary Development- sequence words- Misspelled words. Language Development- embedded sentences

UNIT IV REPORT WRITING 12

Listening- Listening to documentaries and making notes. Speaking – mechanics of presentations- Reading – reading for detailed comprehension- Writing- email etiquette- job application – cover letter –Résumé preparation(via email and hard copy)- analytical essays and issue based essays--Vocabulary Development- finding suitable synonyms-paraphrasing-. Language Development-clauses-if conditionals.

UNIT V GROUP DISCUSSION AND JOB APPLICATIONS 12

Listening- TED/Ink talks; Speaking –participating in a group discussion -Reading– reading and understanding technical articles Writing– Writing reports- minutes of a meeting- accident and survey-Vocabulary Development- verbal analogies Language Development- reported speech

TOTAL : 60 PERIODS

OUTCOMES:

At the end of the course learners will be able to:

Read technical texts and write area- specific texts effortlessly.
Listen and comprehend lectures and talks in their area of specialisation successfully.
Speak appropriately and effectively in varied formal and informal contexts.
Write reports and winning job applications.

TEXT BOOKS:

Board of editors. Fluency in English A Course book for Engineering and Technology. Orient Black swan, Hyderabad: 2016

Sudharshana.N.P and Saveetha. C. English for Technical Communication. Cambridge University Press: New Delhi, 2016.

REFERENCES

Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice.Oxford University Press: New Delhi,2014.

Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015

Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.

Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007

Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007

Students can be asked to read Tagore, Chetan Bhagat and for supplementary reading.

MA8251 ENGINEERING MATHEMATICS – II

L	T	P	C
4	0	0	4

OBJECTIVES :

This course is designed to cover topics such as Matrix Algebra, Vector Calculus, Complex Analysis and Laplace Transform. Matrix Algebra is one of the powerful tools to handle practical problems arising in the field of engineering. Vector calculus can be widely used for modelling the various laws of physics. The various methods of complex analysis and Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT I MATRICES 12

Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II VECTOR CALCULUS 12

Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green,s, Gauss divergence and Stoke,s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTIONS 12

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $w = z + c$, cz, $\frac{1}{z}$, z^2 - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

Line integral - Cauchy,s integral theorem – Cauchy,s integral formula – Taylor,s and Laurent,s series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour.

UNIT V LAPLACE TRANSFORMS 12

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

TOTAL: 60 PERIODS

OUTCOMES :

After successfully completing the course, the student will have a good understanding of the following topics and their applications:

Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.

Gradient, divergence and curl of a vector point function and related identities.

Evaluation of line, surface and volume integrals using Gauss, Stokes and Green,s theorems and their verification.

Analytic functions, conformal mapping and complex integration.

Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

TEXT BOOKS :

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2016.

REFERENCES :

Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
Jain R.K. and Iyengar S.R.K., " Advanced Engineering Mathematics ", Narosa Publications, New Delhi , 3rd Edition, 2007.
3. O,Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.
4. Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.
Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

		L	T	P	C
PH8251	**MATERIALS SCIENCE** (Common to courses offered in Faculty of Mechanical Engineering Except B.E. Materials Science and Engineering)	**3**	**0**	**0**	**3**

OBJECTIVES:

To introduce the essential principles of materials science for mechanical and related engineering applications.

UNIT I PHASE DIAGRAMS 9

Solid solutions - Hume Rothery's rules – the phase rule - single component system - one-component system of iron - binary phase diagrams - isomorphous systems - the tie-line rule - the lever rule - application to isomorphous system - eutectic phase diagram - peritectic phase diagram - other invariant reactions – free energy composition curves for binary systems - microstructural change during cooling.

UNIT II FERROUS ALLOYS 9

The iron-carbon equilibrium diagram - phases, invariant reactions - microstructure of slowly cooled steels - eutectoid steel, hypo and hypereutectoid steels - effect of alloying elements on the Fe-C system - diffusion in solids - Fick's laws - phase transformations - T-T-T-diagram for eutectoid steel – pearlitic, baintic and martensitic transformations - tempering of martensite – steels – stainless steels – cast irons.

UNIT III MECHANICAL PROPERTIES 9

Tensile test - plastic deformation mechanisms - slip and twinning - role of dislocations in slip - strengthening methods - strain hardening - refinement of the grain size - solid solution strengthening - precipitation hardening - creep resistance - creep curves - mechanisms of creep - creep-resistant materials - fracture - the Griffith criterion - critical stress intensity factor and its determination - fatigue failure - fatigue tests - methods of increasing fatigue life - hardness - Rockwell and Brinell hardness - Knoop and Vickers microhardness.

UNIT IV MAGNETIC, DIELECTRIC AND SUPERCONDUCTING MATERIALS 9

Ferromagnetism – domain theory – types of energy – hysteresis – hard and soft magnetic materials – ferrites - dielectric materials – types of polarization – Langevin-Debye equation – frequency effects on polarization - dielectric breakdown – insulating materials – Ferroelectric materials - superconducting materials and their properties.

UNIT V NEW MATERIALS 9

Ceramics – types and applications – composites: classification, role of matrix and reinforcement, processing of fiber reinforced plastics – metallic glasses: types , glass forming ability of alloys, melt spinning process, applications - shape memory alloys: phases, shape memory effect, pseudoelastic effect, NiTi alloy, applications – nanomaterials: preparation (bottom up and top down approaches), properties and applications – carbon nanotubes: types.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course,

the students will have knowledge on the various phase diagrams and their applications

the students will acquire knowledge on Fe-Fe_3C phase diagram,various microstructures and alloys

the students will get knowledge on mechanical properties of materials and their measurement

the students will gain knowledge on magnetic, dielectric and superconducting properties of materials

the students will understand the basics of ceramics, composites and nanomaterials.

TEXT BOOKS:

Balasubramaniam, R. “Callister’s Materials Science and Engineering”. Wiley India Pvt. Ltd., 2014.

Raghavan, V. “Physical Metallurgy: Principles and Practice”. PHI Learning, 2015.

Raghavan, V. “Materials Science and Engineering : A First course”. PHI Learning, 2015.

REFERENCES

Askeland, D. “Materials Science and Engineering”. Brooks/Cole, 2010.

Smith, W.F., Hashemi, J. & Prakash, R. “Materials Science and Engineering”. Tata McGraw Hill Education Pvt. Ltd., 2014.

Wahab, M.A. “Solid State Physics: Structure and Properties of Materials”. Narosa Publishing House, 2009.

BE8253 BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING

L T P C

3 0 0 3

OBJECTIVES:

To impart knowledge on

Electric circuit laws, single and three phase circuits and wiring

Working principles of Electrical Machines

Working principle of Various electronic devices and measuring instruments

UNIT I ELECTRICAL CIRCUITS 9

Basic circuit components -, Ohms Law - Kirchoff,s Law – Instantaneous Power – Inductors - Capacitors – Independent and Dependent Sources - steady state solution of DC circuits - Nodal analysis, Mesh analysis- Thevinin,s Theorem, Norton,s Theorem, Maximum Power transfer theorem-Linearity and Superposition Theorem.

UNIT II AC CIRCUITS 9

Introduction to AC circuits – waveforms and RMS value – power and power factor, single phase and three-phase balanced circuits – Three phase loads - housing wiring, industrial wiring, materials of wiring

UNIT III ELECTRICAL MACHINES 9

Principles of operation and characteristics of ; DC machines, Transformers (single and three phase) ,Synchronous machines , three phase and single phase induction motors.

UNIT IV ELECTRONIC DEVICES & CIRCUITS 9

Types of Materials – Silicon & Germanium- N type and P type materials – PN Junction –Forward and Reverse Bias –Semiconductor Diodes –Bipolar Junction Transistor – Characteristics – Field Effect Transistors – Transistor Biasing –Introduction to operational Amplifier –Inverting Amplifier –Non Inverting Amplifier –DAC – ADC .

UNIT V MEASUREMENTS & INSTRUMENTATION 9

Introduction to transducers - Classification of Transducers: Resistive, Inductive, Capacitive, Thermoelectric, piezoelectric, photoelectric, Hall effect and Mechanical - ,Classification of instruments Types of indicating Instruments - multimeters –Oscilloscopes- – three-phase power measurements – instrument transformers (CT and PT)

TOTAL : 45 PERIODS

OUTCOMES:

Ability to

Understand electric circuits and working principles of electrical machines
Understand the concepts of various electronic devices
Choose appropriate instruments for electrical measurement for a specific application

TEXT BOOKS

Leonard S Bobrow, “Foundations of Electrical Engineering”, Oxford University Press, 2013

D P Kothari and I.J Nagarath, ”Electrical Machines “Basic Electrical and Electronics Engineering”, McGraw Hill Education(India) Private Limited, Third Reprint ,2016

Thereja .B.L., “Fundamentals of Electrical Engineering and Electronics”, S. Chand & Co. Ltd., 2008

REFERENCES

Del Toro, “Electrical Engineering Fundamentals”, Pearson Education, New Delhi, 2007

John Bird, “Electrical Circuit Theory and Technology”, Elsevier, First Indian Edition, 2006

Allan S Moris, “Measurement and Instrumentation Principles”, Elseveir, First Indian Edition, 2006

Rajendra Prasad, “Fundamentals of Electrical Engineering”, Prentice Hall of India, 2006

A.E.Fitzgerald, David E Higginbotham and Arvin Grabel, “Basic Electrical Engineering”, McGraw Hill Education(India) Private Limited, 2009

N K De, Dipu Sarkar, “Basic Electrical Engineering”, Universities Press (India)Private Limited 2016

GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

To study the nature and facts about environment.

To finding and implementing scientific, technological, economic and political solutions to environmental problems.

To study the interrelationship between living organism and environment.

To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.

To study the dynamic processes and understand the features of the earth‟s interior and surface.

To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

Public awareness of environmental is at infant stage.

Ignorance and incomplete knowledge has lead to misconceptions

Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS:

Benny Joseph, ˆEnvironmental Science and Engineering,, Tata McGraw-Hill, New Delhi, 2006.

Gilbert M.Masters, ˆIntroduction to Environmental Engineering and Science,, 2nd edition, Pearson Education, 2004.

REFERENCES :

Dharmendra S. Sengar, ˆEnvironmental law,, Prentice hall of India PVT LTD,New Delhi, 2007.

Erach Bharucha, “Textbook of Environmental Studies”, Universities Press(I) PVT, LTD, Hydrabad, 2015.

Rajagopalan, R, ˆEnvironmental Studies-From Crisis to Cure,, Oxford University Press, 2005.

G. Tyler Miller and Scott E. Spoolman, “Environmental Science”, Cengage Learning India PVT, LTD, Delhi, 2014.

GE8292 ENGINEERING MECHANICS L T P C
3204

OBJECTIVES:

To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

UNIT I STATICS OF PARTICLES 9+6

Introduction – Units and Dimensions – Laws of Mechanics – Lami,s theorem, Parallelogram and triangular Law of forces – Vectorial representation of forces – Vector operations of forces -additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility .

UNIT II EQUILIBRIUM OF RIGID BODIES 9+6

Free body diagram – Types of supports –Action and reaction forces – stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon,s theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions

UNIT III PROPERTIES OF SURFACES AND SOLIDS 9+6

Centroids and centre of mass – Centroids of lines and areas - Rectangular, circular, triangular areas by integration – T section, I section, - Angle section, Hollow section by using standard formula – Theorems of Pappus - Area moments of inertia of plane areas – Rectangular, circular, triangular areas by integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Principal moments of inertia of plane areas – Principal axes of inertia-Mass moment of inertia –mass moment of inertia for prismatic, cylindrical and spherical solids from first principle – Relation to area moments of inertia.

UNIT IV DYNAMICS OF PARTICLES 9+6

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion - Newton,s laws of motion – Work Energy Equation– Impulse and Momentum – Impact of elastic bodies.

UNIT V FRICTION AND RIGID BODY DYNAMICS 9+6

Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction – wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

TOTAL : 45+30=75 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

illustrate the vectorial and scalar representation of forces and moments
analyse the rigid body in equilibrium
evaluate the properties of surfaces and solids
calculate dynamic forces exerted in rigid body
determine the friction and the effects by the laws of friction

TEXT BOOKS:

Beer, F.P and Johnston Jr. E.R., “Vector Mechanics for Engineers (In SI Units): Statics and Dynamics”, 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).

Vela Murali, “Engineering Mechanics”, Oxford University Press (2010)

REFERENCES:

Bhavikatti, S.S and Rajashekarappa, K.G., “Engineering Mechanics”, New Age International (P) Limited Publishers, 1998.

Hibbeller, R.C and Ashok Gupta, “Engineering Mechanics: Statics and Dynamics”, 11th Edition, Pearson Education 2010.

Irving H. Shames and Krishna Mohana Rao. G., “Engineering Mechanics – Statics and Dynamics”, 4th Edition, Pearson Education 2006.

Meriam J.L. and Kraige L.G., “ Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2”, Third Edition, John Wiley & Sons,1993.

Rajasekaran S and Sankarasubramanian G., “Engineering Mechanics Statics and Dynamics”, 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.

GE8261 ENGINEERING PRACTICES LABORATORY LTPC
0042

OBJECTIVES:

To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE 13

Buildings:

Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

Study of pipe connections requirements for pumps and turbines.

Preparation of plumbing line sketches for water supply and sewage works.

Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

Study of the joints in roofs, doors, windows and furniture.

Hands-on-exercise:

Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE 18

Welding:

(a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.

(b) Gas welding practice

Basic Machining:

Simple Turning and Taper turning

Drilling Practice

Sheet Metal Work:

Forming & Bending:

Model making – Trays and funnels.

Different type of joints.

Machine assembly practice:

Study of centrifugal pump

Study of air conditioner

Demonstration on:

Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.

Foundry operations like mould preparation for gear and step cone pulley.

Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE **13**

Residential house wiring using switches, fuse, indicator, lamp and energy meter.
Fluorescent lamp wiring.
Stair case wiring
Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
Measurement of energy using single phase energy meter.
Measurement of resistance to earth of an electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE **16**

Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
Study of logic gates AND, OR, EX-OR and NOT.
Generation of Clock Signal.
Soldering practice – Components Devices and Circuits – Using general purpose PCB.

Measurement of ripple factor of HWR and FWR.

TOTAL: 60 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to
fabricate carpentry components and pipe connections including plumbing works.
use welding equipments to join the structures.
Carry out the basic machining operations
Make the models using sheet metal works
Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings
Carry out basic home electrical works and appliances
Measure the electrical quantities
Elaborate on the components, gates, soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	15 Sets.
2. Carpentry vice (fitted to work bench)	15 Nos.
3. Standard woodworking tools	15 Sets.
4. Models of industrial trusses, door joints, furniture joints	5 each
5. Power Tools: (a) Rotary Hammer	2 Nos
(b) Demolition Hammer	2 Nos
(c) Circular Saw	2 Nos
(d) Planer	2 Nos
(e) Hand Drilling Machine	2 Nos
(f) Jigsaw	2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders	5 Nos.
2. Welding booth with exhaust facility	5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos.

5. Centre lathe	2 Nos.
6. Hearth furnace, anvil and smithy tools	2 Sets.
7. Moulding table, foundry tools	2 Sets.
8. Power Tool: Angle Grinder	2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner	One each.

ELECTRICAL

1. Assorted electrical components for house wiring	15 Sets
2. Electrical measuring instruments	10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp	1 each
4. Megger (250V/500V)	1 No.
5. Power Tools: (a) Range Finder	2 Nos
(b) Digital Live-wire detector	2 Nos

ELECTRONICS

1. Soldering guns	10 Nos.
2. Assorted electronic components for making circuits	50 Nos.
3. Small PCBs	10 Nos.
4. Multimeters	10 Nos.
Study purpose items: Telephone, FM radio, low-voltage power supply	

BE8261 BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY **LTPC 0 042**

OBJECTIVE:

To train the students in performing various tests on electrical drives, sensors and circuits.

LIST OF EXPERIMENTS:

Load test on separately excited DC generator
Load test on Single phase Transformer
Load test on Induction motor
Verification of Circuit Laws
Verification of Circuit Theorems
Measurement of three phase power
Load test on DC shunt motor.
Diode based application circuits
Transistor based application circuits
Study of CRO and measurement of AC signals
Characteristics of LVDT
Calibration of Rotometer
RTD and Thermistor

Minimum of 10 Experiments to be carried out :-

TOTAL: 60 PERIODS

OUTCOMES:

Ability to determine the speed characteristic of different electrical machines
Ability to design simple circuits involving diodes and transistors
Ability to use operational amplifiers

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	D. C. Motor Generator Set	2
2	D.C. Shunt Motor	2
3	Single Phase Transformer	2
4	Single Phase Induction Motor	2
5	Ammeter A.C and D.C	20
6	Voltmeters A.C and D.C	20
7.	Watt meters LPF and UPF	4
8.	Resistors & Breadboards	-
9.	Cathode Ray Oscilloscopes	4
10.	Dual Regulated power supplies	6
11.	A.C. Signal Generators	4
12.	Transistors (BJT, JFET)	-

MA8353 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C
4 0 0 4

OBJECTIVES:

To introduce the basic concepts of PDE for solving standard partial differential equations.
To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
To acquaint the student with Fourier transform techniques used in wide variety of situations.
To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations – Singular integrals - Solutions of standard types of first order partial differential equations - Lagrange,s linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT II FOURIER SERIES 12

Dirichlet,s conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier series – Parseval,s identity – Harmonic analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 12

Classification of PDE – Method of separation of variables - Fourier Series Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT IV FOURIER TRANSFORMS 12

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval,s identity.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 12

Z-transforms - Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL : 60 PERIODS

OUTCOMES :

Upon successful completion of the course, students should be able to:

Understand how to solve the given standard partial differential equations.

Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.

Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.

Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

TEXT BOOKS :

Grewal B.S., “Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.

Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.

REFERENCES :

B.V Ramana.., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.

Erwin Kreyszig, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, India, 2016.

G. James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

L.C Andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SPIE Press, 1999.

N.P. Bali. and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Edition, Laxmi Publications Pvt. Ltd, 2014.

R.C. Wylie, and Barrett, L.C., “Advanced Engineering Mathematics “Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

ME8391 ENGINEERING THERMODYNAMICS LTPC

3 2 0 4

OBJECTIVE:

To familiarize the students to understand the fundamentals of thermodynamics and to perform thermal analysis on their behavior and performance.

(Use of Standard and approved Steam Table, Mollier Chart, Compressibility Chart and Psychrometric Chart permitted)

UNIT I BASIC CONCEPTS AND FIRST LAW 9+6

Basic concepts - concept of continuum, comparison of microscopic and macroscopic approach. Path and point functions. Intensive and extensive, total and specific quantities. System and their types. Thermodynamic Equilibrium State, path and process. Quasi-static, reversible and irreversible processes. Heat and work transfer, definition and comparison, sign convention. Displacement work and other modes of work .P-V diagram. Zeroth law of thermodynamics – concept of temperature and thermal equilibrium– relationship between temperature scales –new temperature scales. First law of thermodynamics –application to closed and open systems – steady and unsteady flow processes.

UNIT II SECOND LAW AND AVAILABILITY ANALYSIS 9+6

Heat Reservoir, source and sink. Heat Engine, Refrigerator, Heat pump. Statements of second law and its corollaries. Carnot cycle Reversed Carnot cycle, Performance. Clausius inequality. Concept of entropy, T-s diagram, Tds Equations, entropy change for - pure substance, ideal gases - different processes, principle of increase in entropy. Applications of II Law. High and low grade energy. Available and non-available energy of a source and finite body. Energy and irreversibility.

Expressions for the energy of a closed system and open systems. Energy balance and entropy generation. Irreversibility. I and II law Efficiency.

UNIT III PROPERTIES OF PURE SUBSTANCE AND STEAM POWER CYCLE 9+6

Formation of steam and its thermodynamic properties, p-v, p-T, T-v, T-s, h-s diagrams. p-v-T surface. Use of Steam Table and Mollier Chart. Determination of dryness fraction. Application of I and II law for pure substances. Ideal and actual Rankine cycles, Cycle Improvement Methods - Reheat and Regenerative cycles, Economiser, preheater, Binary and Combined cycles.

UNIT IV IDEAL AND REAL GASES, THERMODYNAMIC RELATIONS 9+6

Properties of Ideal gas- Ideal and real gas comparison- Equations of state for ideal and real gases- Reduced properties. Compressibility factor-.Principle of Corresponding states. -Generalised Compressibility Chart and its use-. Maxwell relations, Tds Equations, Difference and ratio of

heat capacities, Energy equation, Joule-Thomson Coefficient, Clausius Clapeyron equation, Phase Change Processes. Simple Calculations.

UNIT V GAS MIXTURES AND PSYCHROMETRY 9+6

Mole and Mass fraction, Dalton,s and Amagat,s Law. Properties of gas mixture – Molar mass, gas constant, density, change in internal energy, enthalpy, entropy and Gibbs function. Psychrometric properties, Psychrometric charts. Property calculations of air vapour mixtures by using chart and expressions. Psychrometric process – adiabatic saturation, sensible heating and cooling, humidification, dehumidification, evaporative cooling and adiabatic mixing. Simple Applications

TOTAL : 75 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.

CO2 Apply second law of thermodynamics to open and closed systems and calculate entropy and availability.

CO3 Apply Rankine cycle to steam power plant and compare few cycle improvement methods

CO4 Derive simple thermodynamic relations of ideal and real gases

CO5 Calculate the properties of gas mixtures and moist air and its use in psychometric processes

TEXT BOOKS :

R.K.Rajput, “A Text Book Of Engineering Thermodynamics “,Fifth Edition,2017.

Yunus a. Cengel & michael a. Boles, “Thermodynamics”, 8th edition 2015.

REFERENCES:

Arora C.P, “Thermodynamics”, Tata McGraw-Hill, New Delhi, 2003.

Borgnakke & Sonnatag, “Fundamental of Thermodynamics”, 8th Edition , 2016.

Chattopadhyay, P, ''Engineering Thermodynamics'', Oxford University Press, 2016.

Michael J. Moran, Howard N. Shapiro, “Fundamentals of Engineering Thermodynamics”, 8th Edition.

Nag.P.K., “Engineering Thermodynamics”, 5th Edition, Tata McGraw-Hill, New Delhi, 2013.

CE8394 FLUID MECHANICS AND MACHINERY LTPC

4 0 0 4

OBJECTIVES

The properties of fluids and concept of control volume are studied

The applications of the conservation laws to flow through pipes are studied.

To understand the importance of dimensional analysis

To understand the importance of various types of flow in pumps.

To understand the importance of various types of flow in turbines.

UNIT I FLUID PROPERTIES AND FLOW CHARACTERISTICS 12

Units and dimensions- Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapor pressure, surface tension and capillarity. Flow characteristics – concept of control volume - application of continuity equation, energy equation and momentum equation.

UNIT II FLOW THROUGH CIRCULAR CONDUITS 12

Hydraulic and energy gradient - Laminar flow through circular conduits and circular annuli-Boundary layer concepts – types of boundary layer thickness – Darcy Weisbach equation –friction factor-Moody diagram- commercial pipes- minor losses – Flow through pipes in series and parallel.

UNIT III DIMENSIONAL ANALYSIS 12

Need for dimensional analysis – methods of dimensional analysis – Similitude –types of similitude - Dimensionless parameters- application of dimensionless parameters – Model analysis.

UNIT IV PUMPS 12

Impact of jets - Euler,s equation - Theory of roto-dynamic machines – various efficiencies– velocity components at entry and exit of the rotor- velocity triangles - Centrifugal pumps– working principle work done by the impeller - performance curves - Reciprocating pump- working principle – Rotary pumps –classification.

UNIT V TURBINES 12

Classification of turbines – heads and efficiencies – velocity triangles. Axial, radial and mixed flow turbines. Pelton wheel, Francis turbine and Kaplan turbines- working principles - work done by water on the runner – draft tube. Specific speed - unit quantities – performance curves for turbines – governing of turbines.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to

Apply mathematical knowledge to predict the properties and characteristics of a fluid.

Can analyse and calculate major and minor losses associated with pipe flow in piping networks.

Can mathematically predict the nature of physical quantities

Can critically analyse the performance of pumps

Can critically analyse the performance of turbines.

TEXT BOOK:

Modi P.N. and Seth, S.M. "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi 2013.

REFERENCES:

Graebel. W.P, "Engineering Fluid Mechanics", Taylor & Francis, Indian Reprint, 2011

Kumar K. L., "Engineering Fluid Mechanics", Eurasia Publishing House(p) Ltd., New Delhi 2016

Robert W.Fox, Alan T. McDonald, Philip J.Pritchard, “Fluid Mechanics and Machinery”, 2011.

Streeter, V. L. and Wylie E. B., "Fluid Mechanics", McGraw Hill Publishing Co. 2010

ME8351 MANUFACTURING TECHNOLOGY – I L T P C
3 0 0 3

OBJECTIVE:

To introduce the concepts of basic manufacturing processes and fabrication techniques, such as metal casting, metal joining, metal forming and manufacture of plastic components.

UNIT I METAL CASTING PROCESSES 9

Sand Casting : Sand Mould – Type of patterns - Pattern Materials – Pattern allowances –Moulding sand Properties and testing – Cores –Types and applications – Moulding machines– Types and applications; Melting furnaces : Blast and Cupola Furnaces; Principle of special casting processes : Shell - investment – Ceramic mould – Pressure die casting - Centrifugal Casting - CO2 process – Stir casting; Defects in Sand casting

UNIT II JOINING PROCESSES 9

Operating principle, basic equipment, merits and applications of: Fusion welding processes: Gas welding - Types – Flame characteristics; Manual metal arc welding – Gas Tungsten arc welding

Gas metal arc welding – Submerged arc welding – Electro slag welding; Operating principle and applications of: Resistance welding - Plasma arc welding – Thermit welding – Electron beam welding – Friction welding and Friction Stir Welding; Brazing and soldering; Weld defects: types, causes and cure.

UNIT III METAL FORMING PROCESSES 9

Hot working and cold working of metals – Forging processes – Open, impression and closed die forging – forging operations. Rolling of metals– Types of Rolling – Flat strip rolling – shape rolling operations – Defects in rolled parts. Principle of rod and wire drawing – Tube drawing – Principles of Extrusion – Types – Hot and Cold extrusion.

UNIT IV SHEET METAL PROCESSES 9

Sheet metal characteristics – shearing, bending and drawing operations – Stretch forming operations – Formability of sheet metal – Test methods –special forming processes-Working principle and applications – Hydro forming – Rubber pad forming – Metal spinning– Introduction of Explosive forming, magnetic pulse forming, peen forming, Super plastic forming – Micro forming

UNIT V MANUFACTURE OF PLASTIC COMPONENTS 9

Types and characteristics of plastics – Moulding of thermoplastics – working principles and typical applications – injection moulding – Plunger and screw machines – Compression moulding, Transfer Moulding – Typical industrial applications – introduction to blow moulding –Rotational moulding – Film blowing – Extrusion – Thermoforming – Bonding of Thermoplastics.

TOTAL: 45 PERIODS

OUTCOMES:

CO1 Explain different metal casting processes, associated defects, merits and demerits
CO2 Compare different metal joining processes.
CO3 Summarize various hot working and cold working methods of metals.
CO4 Explain various sheet metal making processes.
CO5 Distinguish various methods of manufacturing plastic components.

TEXT BOOKS:

Hajra Chouldhary S.K and Hajra Choudhury. AK., "Elements of workshop Technology", volume I and II, Media promoters and Publishers Private Limited, Mumbai, 2008

Kalpakjian. S, “Manufacturing Engineering and Technology”, Pearson Education India Edition, 2013

REFERENCES:

Gowri P. Hariharan, A.Suresh Babu, "Manufacturing Technology I", Pearson Education, 2008

Paul Degarma E, Black J.T and Ronald A. Kosher, "Materials and Processes, in Manufacturing" Eight Edition, Prentice – Hall of India, 1997.

Rao, P.N. "Manufacturing Technology Foundry, Forming and Welding", 4th Edition, TMH-2013

Roy. A. Lindberg, "Processes and Materials of Manufacture", PHI / Pearson education, 2006

Sharma, P.C., "A Text book of production Technology", S.Chand and Co. Ltd., 2014.

EE8353 ELECTRICAL DRIVES AND CONTROLS L T P C
3 0 0 3

OBJECTIVES:

To understand the basic concepts of different types of electrical machines and their performance.
To study the different methods of starting D.C motors and induction motors.
To study the conventional and solid-state drives

UNIT I INTRODUCTION 8

Basic Elements – Types of Electric Drives – factors influencing the choice of electrical drives – heating and cooling curves – Loading conditions and classes of duty – Selection of power rating for drive motors with regard to thermal overloading and Load variation factors

UNIT II DRIVE MOTOR CHARACTERISTICS 9

Mechanical characteristics – Speed-Torque characteristics of various types of load and drive motors – Braking of Electrical motors – DC motors: Shunt, series and compound - single phase and three phase induction motors**.**

UNIT III STARTING METHODS 8

Types of D.C Motor starters – Typical control circuits for shunt and series motors – Three phase squirrel cage and slip ring induction motors.

UNIT IV CONVENTIONAL AND SOLID STATE SPEED CONTROL OF D.C. DRIVES 10

Speed control of DC series and shunt motors – Armature and field control, Ward-Leonard control system - Using controlled rectifiers and DC choppers –applications.

UNIT V CONVENTIONAL AND SOLID STATE SPEED CONTROL OF A.C. DRIVES 10

Speed control of three phase induction motor – Voltage control, voltage / frequency control, slip power recovery scheme – Using inverters and AC voltage regulators – applications.

TOTAL: 45 PERIODS

OUTCOME:

Upon Completion of this subject, the students can able to explain different types of electrical machines and their performance

TEXT BOOKS:

Nagrath .I.J. & Kothari .D.P, “Electrical Machines”, Tata McGraw-Hill, 2006
Vedam Subrahmaniam, “Electric Drives (Concepts and Applications)”, Tata McGraw-Hill, 2010

REFERENCES:

Partab. H., “Art and Science and Utilisation of Electrical Energy”, Dhanpat Rai and Sons, 2017
Pillai.S.K “A First Course on Electric Drives”, Wiley Eastern Limited, 2012
Singh. M.D., K.B.Khanchandani, “Power Electronics”, Tata McGraw-Hill, 2006.

ME8361 MANUFACTURING TECHNOLOGY LABORATORY – I LTPC 0042

OBJECTIVE:

To Study and practice the various operations that can be performed in lathe, shaper, drilling, milling machines etc. and to equip with the practical knowledge required in the core industries.

LIST OF EXPERIMENTS

Machining and Machining time estimations for:

Taper Turning
External Thread cutting
Internal Thread Cutting
Eccentric Turning
Knurling
Square Head Shaping
Hexagonal Head Shaping
Fabrication of simple structural shapes using Gas Metal Arc Welding
Joining of plates and pipes using Gas Metal Arc Welding/ Arc Welding /Submerged arc welding
Preparation of green sand moulds

11 Manufacturing of simple sheet metal components using shearing and bending operations.

12. Manufacturing of sheet metal components using metal spinning on a lathe

TOTAL: 60 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Demonstrate the safety precautions exercised in the mechanical workshop.
CO2 Make the workpiece as per given shape and size using Lathe.
CO3 Join two metals using arc welding.
CO4 Use sheet metal fabrication tools and make simple tray and funnel.
CO5 Use different moulding tools, patterns and prepare sand moulds.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. NO.	NAME OF THE EQUIPMENT	Qty.
1	Centre Lathes	7 Nos.
2	Horizontal Milling Machine	1 No
3	Vertical Milling Machine	1 No
4	Shaper	1 No.
5	Arc welding transformer with cables and holders	2 Nos
6	Oxygen and acetylene gas cylinders, blow pipe and other welding outfit	1 No
7	Moulding table, Moulding equipments	2 Nos
8	Sheet metal forming tools and equipments	2 Nos.

ME8381 COMPUTER AIDED MACHINE DRAWING **L T P C**
0 0 4 2

OBJECTIVES:

To make the students understand and interpret drawings of machine components

To prepare assembly drawings both manually and using standard CAD packages

To familiarize the students with Indian Standards on drawing practices and standard components

To gain practical experience in handling 2D drafting and 3D modeling software systems.

UNIT I DRAWING STANDARDS & FITS AND TOLERANCES 12

Code of practice for Engineering Drawing, BIS specifications – Welding symbols, riveted joints, keys, fasteners – Reference to hand book for the selection of standard components like bolts, nuts, screws, keys etc. - Limits, Fits – Tolerancing of individual dimensions – Specification of Fits – Preparation of production drawings and reading of part and assembly drawings, basic principles of geometric dimensioning & tolerancing.

UNIT II INTRODUCTION TO 2D DRAFTING 16

Drawing, Editing, Dimensioning, Layering, Hatching, Block, Array, Detailing, Detailed drawing.

Bearings - Bush bearing, Plummer block

Valves – Safety and non-return valves.

UNIT III 3D GEOMETRIC MODELING AND ASSEMBLY 32

Sketcher - Datum planes – Protrusion – Holes - Part modeling – Extrusion – Revolve – Sweep – Loft – Blend – Fillet - Pattern – Chamfer - Round - Mirror – Section - Assembly

Couplings – Flange, Universal, Oldham,s, Muff, Gear couplings

Joints – Knuckle, Gib & cotter, strap, sleeve & cotter joints

Engine parts – Piston, connecting rod, cross-head (vertical and horizontal), stuffing box, multi-plate clutch

Miscellaneous machine components – Screw jack, machine vice, tail stock, chuck, vane and gear pump

TOTAL:60 PERIODS

Note: 25% of assembly drawings must be done manually and remaining 75% of assembly drawings must be done by using any CAD software. The above tasks can be performed manually and using standard commercial 2D / 3D CAD software

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Follow the drawing standards, Fits and Tolerances

CO2 Re-create part drawings, sectional views and assembly drawings as per standards

TEXT BOOK:

Gopalakrishna K.R., “Machine Drawing”, 22nd Edition, Subhas Stores Books Corner, Bangalore, 2013

REFERENCES:

N. D. Bhatt and V.M. Panchal, “Machine Drawing”, 48th Edition, Charotar Publishers,2013

Junnarkar, N.D., “Machine Drawing”, 1st Edition, Pearson Education, 2004

N. Siddeshwar, P. Kanniah, V.V.S. Sastri, ”Machine Drawing” , published by Tata Mc GrawHill,2006

S. Trymbaka Murthy, “A Text Book of Computer Aided Machine Drawing”, CBS Publishers, New Delhi, 2007

EE8361 ELECTRICAL ENGINEERING LABORATORY LTPC
0 0 4 2

OBJECTIVE:

To validate the principles studied in theory by performing experiments in the laboratory

LIST OF EXPERIMENTS

Load test on DC Shunt & DC Series motor
O.C.C & Load characteristics of DC Shunt and DC Series generator
Speed control of DC shunt motor (Armature, Field control)
Load test on single phase transformer
O.C & S.C Test on a single phase transformer
Regulation of an alternator by EMF & MMF methods.
V curves and inverted V curves of synchronous Motor
Load test on three phase squirrel cage Induction motor
Speed control of three phase slip ring Induction Motor
Study of DC & AC Starters

TOTAL: 60 PERIODS

OUTCOME:

Ability to perform speed characteristic of different electrical machine

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	DC Shunt motor	2
2	DC Series motor	1
3	DC shunt motor-DC Shunt Generator set	1
4	DC Shunt motor-DC Series Generator set	1
5	Single phase transformer	2
6	Three phase alternator	2
7	Three phase synchronous motor	1
8	Three phase Squirrel cage Induction motor	1
9	Three phase Slip ring Induction motor	1

HS8381 INTERPERSONAL SKILLS/LISTENING & SPEAKING L T P C
0 0 2 1

OBJECTIVES: The Course will enable learners to:

Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
improve general and academic listening skills
Make effective presentations.

UNIT I

Listening as a key skill- its importance- speaking - give personal information - ask for personal information - express ability - enquire about ability - ask for clarification Improving pronunciation - pronunciation basics taking lecture notes - preparing to listen to a lecture - articulate a complete idea as opposed to producing fragmented utterances.

UNIT II

Listen to a process information- give information, as part of a simple explanation - conversation starters: small talk - stressing syllables and speaking clearly - intonation patterns - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

UNIT III

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk - greet - respond to greetings - describe health and symptoms - invite and offer - accept - decline - take leave - listen for and follow the gist- listen for detail

UNIT IV

Being an active listener: giving verbal and non-verbal feedback - participating in a group discussion - summarizing academic readings and lectures conversational speech listening to and participating in conversations - persuade.

UNIT V

Formal and informal talk - listen to follow and respond to explanations, directions and instructions in academic and business contexts - strategies for presentations and interactive communication - group/pair presentations - negotiate disagreement in group work.

TOTAL : 30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:

Listen and respond appropriately.
Participate in group discussions
Make effective presentations
Participate confidently and appropriately in conversations both formal and informal

TEXT BOOKS:

Brooks,Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011.

Richards,C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010

REFERENCES

Bhatnagar, Nitin and MamtaBhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.

Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.

Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford, 2014

Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.

Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.

MA8452 STATISTICS AND NUMERICAL METHODS

L	T	P	C
4	0	0	4

OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 12

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) - Goodness of fit.

UNIT II DESIGN OF EXPERIMENTS 12

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi,s method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 12

Lagrange,s and Newton,s divided difference interpolations – Newton,s forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson,s 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 12

Single step methods : Taylor,s series method - Euler,s method - Modified Euler,s method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods : Milne,s and Adams - Bash forth predictor corrector methods for solving first order equations.

TOTAL : 60 PERIODS

OUTCOMES :

Upon successful completion of the course, students will be able to:

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.
- Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications

TEXT BOOKS :

Grewal. B.S. and Grewal. J.S., “Numerical Methods in Engineering and Science ", 10th Edition, Khanna Publishers, New Delhi, 2015.

Johnson, R.A., Miller, I and Freund J., “Miller and Freund,s Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES :

Burden, R.L and Faires, J.D, "Numerical Analysis”, 9th Edition, Cengage Learning, 2016.

Devore. J.L., "Probability and Statistics for Engineering and the Sciences”, Cengage Learning, New Delhi, 8th Edition, 2014.

Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis” Pearson Education, Asia, New Delhi, 2006.

Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum,s Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 2004.

Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., “Probability and Statistics for Engineers and Scientists", 8th Edition, Pearson Education, Asia, 2007.

ME8492	**KINEMATICS OF MACHINERY**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

To understand the basic components and layout of linkages in the assembly of a system machine.

To understand the principles in analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism.

To understand the motion resulting from a specified set of linkages, design few linkage mechanisms and cam mechanisms for specified output motions.

To understand the basic concepts of toothed gearing and kinematics of gear trains and the effects of friction in motion transmission and in machine components.

UNIT I BASICS OF MECHANISMS 9 Classification of mechanisms – Basic kinematic concepts and definitions – Degree of

freedom, Mobility – Kutzbach criterion, Gruebler,s criterion – Grashof,s Law – Kinematic inversions of four-bar chain and slider crank chains – Limit positions – Mechanical advantage – Transmission Angle – Description of some common mechanisms – Quick return mechanisms, Straight line generators, Universal Joint – rocker mechanisms.

UNIT II KINEMATICS OF LINKAGE MECHANISMS 9

Displacement, velocity and acceleration analysis of simple mechanisms – Graphical method– Velocity and acceleration polygons – Velocity analysis using instantaneous centres – kinematic analysis of simple mechanisms – Coincident points – Coriolis component of Acceleration – Introduction to linkage synthesis problem.

UNIT III KINEMATICS OF CAM MECHANISMS 9

Classification of cams and followers – Terminology and definitions – Displacement diagrams – Uniform velocity, parabolic, simple harmonic and cycloidal motions – Derivatives of follower motions – Layout of plate cam profiles – Specified contour cams – Circular arc and tangent cams – Pressure angle and undercutting – sizing of cams.

UNIT IV GEARS AND GEAR TRAINS 9

Law of toothed gearing – Involutes and cycloidal tooth profiles –Spur Gear terminology and definitions –Gear tooth action – contact ratio – Interference and undercutting. Helical, Bevel, Worm, Rack and Pinion gears [Basics only]. Gear trains – Speed ratio, train value – Parallel axis gear trains – Epicyclic Gear Trains.

UNIT V FRICTION IN MACHINE ELEMENTS 9

Surface contacts – Sliding and Rolling friction – Friction drives – Friction in screw threads – Bearings and lubrication – Friction clutches – Belt and rope drives – Friction in brakes- Band and Block brakes.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Discuss the basics of mechanism
CO2 Calculate velocity and acceleration in simple mechanisms
CO3 Develop CAM profiles
CO4 Solve problems on gears and gear trains
CO5 Examine friction in machine elements

TEXT BOOKS:

F.B. Sayyad, “Kinematics of Machinery”, MacMillan Publishers Pvt Ltd., Tech-max Educational resources, 2011.

Rattan, S.S, “Theory of Machines”, 4th Edition, Tata McGraw-Hill, 2014.

3. Uicker, J.J., Pennock G.R and Shigley, J.E., “Theory of Machines and Mechanisms”, 4th Edition, Oxford University Press, 2014.

REFERENCES:

Allen S. Hall Jr., “Kinematics and Linkage Design”, Prentice Hall, 1961

Cleghorn. W. L, “Mechanisms of Machines”, Oxford University Press, 2014

Ghosh. A and Mallick, A.K., “Theory of Mechanisms and Machines", 3rd Edition Affiliated East-West Pvt. Ltd., New Delhi, 2006.

John Hannah and Stephens R.C., "Mechanics of Machines", Viva Low-Prices Student Edition, 1999.

Thomas Bevan, "Theory of Machines", 3rd Edition, CBS Publishers and Distributors, 2005.

ME8451 MANUFACTURING TECHNOLOGY – II

L	T	P	C
3	0	0	3

OBJECTIVES:

To understand the concept and basic mechanics of metal cutting, working of standard machine tools such as lathe, shaping and allied machines, milling, drilling and allied machines, grinding and allied machines and broaching.

To understand the basic concepts of Computer Numerical Control (CNC) of machine tools and CNC Programming

UNIT I THEORY OF METAL CUTTING 9

Mechanics of chip formation, single point cutting tool, forces in machining, Types of chip, cutting tools– nomenclature, orthogonal metal cutting, thermal aspects, cutting tool materials, tool wear, tool life, surface finish, cutting fluids and Machinability.

UNIT II TURNING MACHINES 9

Centre lathe, constructional features, specification, operations – taper turning methods, thread cutting methods, special attachments, machining time and power estimation. Capstan and turret lathes- tool layout – automatic lathes: semi automatic – single spindle : Swiss type, automatic screw type – multi spindle:

UNIT III SHAPER, MILLING AND GEAR CUTTING MACHINES 9

Shaper - Types of operations. Drilling ,reaming, boring, Tapping. Milling operations-types of milling cutter. Gear cutting – forming and generation principle and construction of gear milling ,hobbing and gear shaping processes –finishing of gears.

UNIT IV ABRASIVE PROCESS AND BROACHING 9

Abrasive processes: grinding wheel – specifications and selection, types of grinding process– cylindrical grinding, surface grinding, centreless grinding and internal grinding- Typical applications – concepts of surface integrity, broaching machines: broach construction – push, pull, surface and continuous broaching machines

UNIT V CNC MACHINING 9

Numerical Control (NC) machine tools – CNC types, constructional details, special features, machining centre, part programming fundamentals CNC – manual part programming – micromachining – wafer machining.

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the mechanism of material removal processes.

CO2 Describe the constructional and operational features of centre lathe and other special purpose lathes.

CO3 Describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines.

CO4 Explain the types of grinding and other super finishing processes apart from gear manufacturing processes.

CO5 Summarize numerical control of machine tools and write a part program.

TEXT BOOKS:

Hajra Choudhury, "Elements of Workshop Technology", Vol.II., Media Promoters 2014

Rao. P.N “Manufacturing Technology - Metal Cutting and Machine Tools", 3rd Edition, Tata McGraw-Hill, New Delhi, 2013.

REFERENCES:

Richerd R Kibbe, John E. Neely, Roland O. Merges and Warren J.White “Machine Tool Practices”, Prentice Hall of India, 1998

Geofrey Boothroyd, "Fundamentals of Metal Machining and Machine Tools", Mc Graw Hill, 1984

HMT, "Production Technology", Tata McGraw Hill, 1998.

Roy. A.Lindberg, “Process and Materials of Manufacture,” Fourth Edition, PHI/Pearson Education 2006.

ME8491	ENGINEERING METALLURGY	L	T	P	C
		3	0	0	3

OBJECTIVE:

To impart knowledge on the structure, properties, treatment, testing and applications of metals and non-metallic materials so as to identify and select suitable materials for various engineering applications.

UNIT I ALLOYS AND PHASE DIAGRAMS 9

Constitution of alloys – Solid solutions, substitutional and interstitial – phase diagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron – carbon equilibrium diagram. Classification of steel and cast Iron microstructure, properties and application.

UNIT II HEAT TREATMENT 9

Definition – Full annealing, stress relief, recrystallisation and spheroidising – normalising, hardening and Tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram CCR – Hardenability, Jominy end quench test - Austempering, martempering – case hardening, carburizing, Nitriding, cyaniding, carbonitriding – Flame and Induction hardening – Vacuum and Plasma hardening. .

UNIT III FERROUS AND NON-FERROUS METALS 9

Effect of alloying additions on steel- α and β stabilisers– stainless and tool steels – HSLA, Maraging steels – Cast Iron - Grey, white, malleable, spheroidal – alloy cast irons, Copper and copper alloys – Brass, Bronze and Cupronickel – Aluminium and Al-Cu – precipitation strengthening treatment – Bearing alloys, Mg-alloys, Ni-based super alloys and Titanium alloys.

UNIT IV NON-METALLIC MATERIALS 9

Polymers – types of polymer, commodity and engineering polymers – Properties and applications of various thermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET,PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, Polymers – Urea and Phenol formaldehydes)- Engineering Ceramics – Properties and applications of Al2O3, SiC, Si3N4, PSZ and SIALON –Composites-Classifications-Metal Matrix and FRP - Applications of Composites.

UNIT V MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS 9

Mechanisms of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test lzod and charpy, fatigue and creep failure mechanisms.

TOTAL: 45 PERIODS

OUTCOMES

Upon the completion of this course the students will be able to

CO1 Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.
CO2 Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.
CO3 Clarify the effect of alloying elements on ferrous and non-ferrous metals
CO4 Summarize the properties and applications of non metallic materials.
CO5 Explain the testing of mechanical properties. .

TEXT BOOKS:

Avner, S.H., “Introduction to Physical Metallurgy”, McGraw Hill Book Company,1997.
Williams D Callister, “Material Science and Engineering” Wiley India Pvt Ltd, Revised Indian Edition 2014

REFERENCES:

Kenneth G.Budinski and Michael K. Budinski, “Engineering Materials”, Prentice Hall of India Private Limited, 2010.

Raghavan.V, “Materials Science and Engineering”, Prentice Hall of India Pvt. Ltd., 2015.

U.C.Jindal : Material Science and Metallurgy, "Engineering Materials and Metallurgy", First Edition, Dorling Kindersley, 2012

Upadhyay. G.S. and Anish Upadhyay, “Materials Science and Engineering”, Viva Books Pvt. Ltd., New Delhi, 2006.

CE8395	STRENGTH OF MATERIALS FOR MECHANICAL ENGINEERS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the concepts of stress, strain, principal stresses and principal planes.

To study the concept of shearing force and bending moment due to external loads in determinate beams and their effect on stresses.

To determine stresses and deformation in circular shafts and helical spring due to torsion.

To compute slopes and deflections in determinate beams by various methods.

To study the stresses and deformations induced in thin and thick shells.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 9

Rigid bodies and deformable solids – Tension, Compression and Shear Stresses – Deformation of simple and compound bars – Thermal stresses – Elastic constants – Volumetric strains –Stresses on inclined planes – principal stresses and principal planes – Mohr,s circle of stress.

UNIT II TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAM 9 Beams – types transverse loading on beams – Shear force and bending moment in beams

– Cantilevers – Simply supported beams and over – hanging beams. Theory of simple bending– bending stress distribution – Load carrying capacity – Proportioning of sections – Flitched beams – Shear stress distribution.

UNIT III TORSION 9

Torsion formulation stresses and deformation in circular and hollows shafts – Stepped shafts– Deflection in shafts fixed at the both ends – Stresses in helical springs – Deflection of helical springs, carriage springs.

UNIT IV DEFLECTION OF BEAMS 9

Double Integration method – Macaulay,s method – Area moment method for computation of slopes and deflections in beams - Conjugate beam and strain energy – Maxwell,s reciprocal theorems.

UNIT V THIN CYLINDERS, SPHERES AND THICK CYLINDERS 9

Stresses in thin cylindrical shell due to internal pressure circumferential and longitudinal stresses and deformation in thin and thick cylinders – spherical shells subjected to internal pressure – Deformation in spherical shells – Lame,s theorem.

TOTAL: 45 PERIODS

OUTCOMES

Students will be able to

Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.

Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.

Apply basic equation of simple torsion in designing of shafts and helical spring

Calculate the slope and deflection in beams using different methods.

Analyze and design thin and thick shells for the applied internal and external pressures.

TEXT BOOKS:

Bansal, R.K., "Strength of Materials", Laxmi Publications (P) Ltd., 2016

Jindal U.C., "Strength of Materials", Asian Books Pvt. Ltd., New Delhi, 2009

REFERENCES:

Egor. P.Popov “Engineering Mechanics of Solids” Prentice Hall of India, New Delhi, 2002

Ferdinand P. Been, Russell Johnson, J.r. and John J. Dewole "Mechanics of Materials", Tata McGraw Hill Publishing ˆco. Ltd., New Delhi, 2005.

Hibbeler, R.C., "Mechanics of Materials", Pearson Education, Low Price Edition, 2013

Subramanian R., "Strength of Materials", Oxford University Press, Oxford Higher Education Series, 2010.

ME8493	THERMAL ENGINEERING - I	L	T	P	C
		3	0	0	3

OBJECTIVES:

To integrate the concepts, laws and methodologies from the first course in thermodynamics into analysis of cyclic processes

To apply the thermodynamic concepts into various thermal application like IC engines, Steam. Turbines, Compressors and Refrigeration and Air conditioning systems

(Use of standard refrigerant property data book, Steam Tables, Mollier diagram and Psychrometric chart permitted)

UNIT I GAS AND STEAM POWER CYCLES 9

Air Standard Cycles - Otto, Diesel, Dual, Brayton – Cycle Analysis, Performance and Comparison – Rankine, reheat and regenerative cycle.

UNIT II RECIPROCATING AIR COMPRESSOR 9

Classification and comparison, working principle, work of compression - with and without clearance, Volumetric efficiency, Isothermal efficiency and Isentropic efficiency. Multistage air compressor with Intercooling. Working principle and comparison of Rotary compressors with reciprocating air compressors.

UNIT III INTERNAL COMBUSTION ENGINES AND COMBUSTION 9

IC engine – Classification, working, components and their functions. Ideal and actual : Valve and port timing diagrams, p-v diagrams- two stroke & four stroke, and SI & CI engines – comparison. Geometric, operating, and performance comparison of SI and CI engines. Desirable properties and qualities of fuels. Air-fuel ratio calculation – lean and rich mixtures. Combustion in SI & CI Engines – Knocking – phenomena and control.

UNIT IV INTERNAL COMBUSTION ENGINE PERFORMANCE AND SYSTEMS 9

Performance parameters and calculations. Morse and Heat Balance tests. Multipoint Fuel Injection system and Common Rail Direct Injection systems. Ignition systems – Magneto, Battery and Electronic. Lubrication and Cooling systems. Concepts of Supercharging and Turbocharging – Emission Norms.

UNIT V GAS TURBINES 9

Gas turbine cycle analysis – open and closed cycle. Performance and its improvement - Regenerative, Intercooled, Reheated cycles and their combinations. Materials for Turbines.

TOTAL:45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Apply thermodynamic concepts to different air standard cycles and solve problems.
CO2 Solve problems in single stage and multistage air compressors
CO3 Explain the functioning and features of IC engines, components and auxiliaries.
CO4 Calculate performance parameters of IC Engines.
CO5 Explain the flow in Gas turbines and solve problems.

TEXT BOOKS:

Kothandaraman.C.P., Domkundwar. S,Domkundwar. A.V., “A course in thermal Engineering", Fifth Edition, ”Dhanpat Rai & sons , 2016
Rajput. R. K., “Thermal Engineering” S.Chand Publishers, 2017

REFERENCES:

Arora.C.P, ”Refrigeration and Air Conditioning ,” Tata McGraw-Hill Publishers 2008
Ganesan V..” Internal Combustion Engines” , Third Edition, Tata Mcgraw-Hill 2012
Ramalingam. K.K., "Thermal Engineering", SCITECH Publications (India) Pvt. Ltd., 2009.
Rudramoorthy, R, “Thermal Engineering “,Tata McGraw-Hill, New Delhi,2003
Sarkar, B.K,”Thermal Engineering” Tata McGraw-Hill Publishers, 2007

ME8462 MANUFACTURING TECHNOLOGY LABORATORY – II

L	T	P	C
0	0	4	2

OBJECTIVE:

To Study and acquire knowledge on various basic machining operations in special purpose machines and its applications in real life manufacture of components in the industry

LIST OF EXPERIMENTS:

Contour milling using vertical milling machine
Spur gear cutting in milling machine
Helical Gear Cutting in milling machine
Gear generation in hobbing machine
Gear generation in gear shaping machine
Plain Surface grinding
Cylindrical grinding
Tool angle grinding with tool and Cutter Grinder
Measurement of cutting forces in Milling / Turning Process
CNC Part Programming

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 use different machine tools to manufacturing gears
CO2 Ability to use different machine tools to manufacturing gears.
CO3 Ability to use different machine tools for finishing operations
CO4 Ability to manufacture tools using cutter grinder
CO5 Develop CNC part programming

TOTAL: 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Turret and Capstan Lathes	1 No each
2	Horizontal Milling Machine	2 No
3	Vertical Milling Machine	1 No
4	Surface Grinding Machine	1 No.
5	Cylinderical Grinding Machine	1 No.
6	Radial Drilling Machine	1 No.
7	lathe Tool Dynamometer	1 No
8	Milling Tool Dynamometer	1 No
9	Gear Hobbing Machine	1 No
10	Tool Makers Microscope	1 No
11	CNC Lathe	1 No
12	CNC Milling machine	1 No
13	Gear Shaping machine	1 No
14	Centerless grinding machine	1 No
15	Tool and cutter grinder	1 No

CE8381 STRENGTH OF MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

To study the mechanical properties of materials when subjected to different types of loading.

To verify the principles studied in Fluid Mechanics theory by performing experiments in lab.

STRENGTH OF MATERIALS **30**

LIST OF EXPERIMENTS

Tension test on a mild steel rod
Double shear test on Mild steel and Aluminium rods
Torsion test on mild steel rod
Impact test on metal specimen
Hardness test on metals - Brinnell and Rockwell Hardness Number
Deflection test on beams
Compression test on helical springs
Strain Measurement using Rosette strain gauge
Effect of hardening- Improvement in hardness and impact resistance of steels.
Tempering- Improvement Mechanical properties Comparison

Unhardened specimen
Quenched Specimen and
Quenched and tempered specimen.

Microscopic Examination of
Hardened samples and
Hardened and tempered samples.

OUTCOME:

Ability to perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Universal Tensile Testing machine with double 1 shear attachment – 40 Ton Capacity	1
2	Torsion Testing Machine (60 NM Capacity)	1
3	Impact Testing Machine (300 J Capacity)	1
4	Brinell Hardness Testing Machine	1
5	Rockwell Hardness Testing Machine	1
6	Spring Testing Machine for tensile and compressive loads (2500 N)	1
7	Metallurgical Microscopes	3
8	Muffle Furnace (800 C)	1

FLUID MECHANICS AND MACHINES LABORATORY **30**

LIST OF EXPERIMENTS

Determination of the Coefficient of discharge of given Orifice meter.
Determination of the Coefficient of discharge of given Venturi meter.
Calculation of the rate of flow using Rota meter.
Determination of friction factor for a given set of pipes.
Conducting experiments and drawing the characteristic curves of centrifugal pump/ submergible pump
Conducting experiments and drawing the characteristic curves of reciprocating pump.
Conducting experiments and drawing the characteristic curves of Gear pump.
Conducting experiments and drawing the characteristic curves of Pelton wheel.
Conducting experiments and drawing the characteristics curves of Francis turbine.
Conducting experiments and drawing the characteristic curves of Kaplan turbine.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to:
Perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.
Use the measurement equipments for flow measurement.
Perform test on different fluid machinery.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. NO.	NAME OF THE EQUIPMENT	Qty.
1	Orifice meter setup	1
2	Venturi meter setup	1
3	Rotameter setup	1
4	Pipe Flow analysis setup	1
5	Centrifugal pump/submergible pump setup	1
6	Reciprocating pump setup	1

7	Gear pump setup	1
8	Pelton wheel setup	1
9	Francis turbine setup	1
10	Kaplan turbine setup	1

HS8461 ADVANCED READING AND WRITING L TPC 0021

OBJECTIVES:

Strengthen the reading skills of students of engineering.
Enhance their writing skills with specific reference to technical writing.
Develop students, critical thinking skills.
Provide more opportunities to develop their project and proposal writing skills.

UNIT I

Reading - Strategies for effective reading-Use glosses and footnotes to aid reading comprehension-Read and recognize different text types-Predicting content using photos and title Writing-Plan before writing- Develop a paragraph: topic sentence, supporting sentences, concluding sentence –Write a descriptive paragraph

UNIT II

Reading-Read for details-Use of graphic organizers to review and aid comprehension Writing-State reasons and examples to support ideas in writing- Write a paragraph with reasons and examples-Write an opinion paragraph

UNIT III

Reading- Understanding pronoun reference and use of connectors in a passage- speed reading techniques-Writing- Elements of a good essay-Types of essays- descriptive-narrative- issue-based-argumentative-analytical.

UNIT IV

Reading- Genre and Organization of Ideas- Writing- Email writing- resumes – Job application- project writing-writing convincing proposals.

UNIT V

Reading- Critical reading and thinking- understanding how the text positions the reader- identify Writing- Statement of Purpose- letter of recommendation- Vision statement

TOTAL: 30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:

Write different types of essays.
Write winning job applications.
Read and evaluate texts critically.
Display critical thinking in various professional contexts.

TEXT BOOKS:

Debra Daise, CharlNorloff, and Paul Carne Reading and Writing (Level 4) Oxford University Press: Oxford, 2011

Gramer F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011

REFERENCES

Davis, Jason and Rhonda LIss.Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006

E. Suresh Kumar and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan: Hyderabad, 2012

Withrow, Jeans and et al. Inspired to Write. Readings and Tasks to develop writing skills. Cambridge University Press: Cambridge, 2004

Goatly, Andrew. Critical Reading and Writing. Routledge: United States of America, 2000

Petelin, Roslyn and Marsh Durham. The Professional Writing Guide: Knowing Well and Knowing Why. Business & Professional Publishing: Australia, 2004

ME8595	THERMAL ENGINEERING – II	L	T	P	C
		3	0	0	3

OBJECTIVES:

To apply the thermodynamic concepts for Nozzles, Boilers, Turbines, and Refrigeration & Air Conditioning Systems.

To understand the concept of utilising residual heat in thermal systems.

UNIT I STEAM NOZZLE **9**

Types and Shapes of nozzles, Flow of steam through nozzles, Critical pressure ratio, Variation of mass flow rate with pressure ratio. Effect of friction. Metastable flow.

UNIT II BOILERS **9**

Types and comparison. Mountings and Accessories. Fuels - Solid, Liquid and Gas. Performance calculations, Boiler trial.

UNIT III STEAM TURBINES **9**

Types, Impulse and reaction principles, Velocity diagrams, Work done and efficiency – optimal operating conditions. Multi-staging, compounding and governing.

UNIT IV COGENERATION AND RESIDUAL HEAT RECOVERY **9**

Cogeneration Principles, Cycle Analysis, Applications, Source and utilisation of residual heat. Heat pipes, Heat pumps, Recuperative and Regenerative heat exchangers. Economic Aspects.

UNIT V REFRIGERATION AND AIR – CONDITIONING **9**

Vapour compression refrigeration cycle, Effect of Superheat and Sub-cooling, Performance calculations, Working principle of air cycle, vapour absorption system, and Thermoelectric refrigeration. Air conditioning systems, concept of RSHF, GSHF and ESHF, Cooling load calculations. Cooling towers – concept and types.

TOTAL:45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Solve problems in Steam Nozzle

CO2 Explain the functioning and features of different types of Boilers and auxiliaries and calculate performance parameters.

CO3 Explain the flow in steam turbines, draw velocity diagrams for steam turbines and solve problems.

CO4 Summarize the concept of Cogeneration, Working features of Heat pumps and Heat exchangers

CO5 Solve problems using refrigerant table / charts and psychrometric charts

TEXT BOOKS:

1. Kothandaraman, C.P., Domkundwar .S and Domkundwar A.V.,"A course in Thermal Engineering", Dhanpat Rai & Sons, 2016.
2. Mahesh. M. Rathore, "Thermal Engineering", 1st Edition, Tata Mc Graw Hill Publications, 2010.

REFERENCES:

Arora .C.P., "Refrigeration and Air Conditioning", Tata Mc Graw Hill, 2008
Ballaney. P.L ." Thermal Engineering", Khanna publishers, 24th Edition 2012
Charles H Butler : Cogeneration" McGraw Hill, 1984.
Donald Q. Kern, " Process Heat Transfer", Tata Mc Graw Hill, 2001.
Sydney Reiter "Industrial and Commercial Heat Recovery Systems" Van Nostrand Reinhols, 1985.

ME8593 DESIGN OF MACHINE ELEMENTS

L	T	P	C
3	0	0	3

OBJECTIVES

To familiarize the various steps involved in the Design Process
To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.
To learn to use standard practices and standard data
To learn to use catalogues and standard machine components
(Use of P S G Design Data Book is permitted)

UNIT I STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS 9

Introduction to the design process - factors influencing machine design, selection of materials based on mechanical properties - Preferred numbers, fits and tolerances – Direct, Bending and torsional stress equations – Impact and shock loading – calculation of principle stresses for various load combinations, eccentric loading – curved beams – crane hook and ˆC, frame- Factor of safety - theories of failure – Design based on strength and stiffness – stress concentration – Design for variable loading.

UNIT II SHAFTS AND COUPLINGS 9

Design of solid and hollow shafts based on strength, rigidity and critical speed – Keys, keyways and splines - Rigid and flexible couplings.

UNIT III TEMPORARY AND PERMANENT JOINTS 9

Threaded fastners - Bolted joints including eccentric loading, Knuckle joints, Cotter joints – Welded joints, riveted joints for structures - theory of bonded joints.

UNIT IV ENERGY STORING ELEMENTS AND ENGINE COMPONENTS 9 Various types of springs, optimization of helical springs - rubber springs - Flywheels considering stresses in rims and arms for engines and punching machines- Connecting Rods and crank shafts.

UNIT V BEARINGS 9

Sliding contact and rolling contact bearings - Hydrodynamic journal bearings, Sommerfeld Number, Raimondi and Boyd graphs, -- Selection of Rolling Contact bearings.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the influence of steady and variable stresses in machine component design.
CO2 Apply the concepts of design to shafts, keys and couplings.
CO3 Apply the concepts of design to temporary and permanent joints.
CO4 Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.
CO5 Apply the concepts of design to bearings.

TEXT BOOKS:

Bhandari V, "Design of Machine Elements", 4th Edition, Tata McGraw-Hill Book Co, 2016.
Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett "Mechanical Engineering Design", 9th Edition, Tata McGraw-Hill, 2011.

REFERENCES:

Alfred Hall, Halowenko, A and Laughlin, H., "Machine Design", Tata McGraw-Hill BookCo.(Schaum,s Outline), 2010

Ansel Ugural, "Mechanical Design – An Integral Approach", 1st Edition, Tata McGraw-Hill Book Co, 2003.

P.C. Gope, "Machine Design – Fundamental and Application", PHI learning private ltd, New Delhi, 2012.

R.B. Patel, "Design of Machine Elements", MacMillan Publishers India P Ltd., Tech-Max Educational resources, 2011.

Robert C. Juvinall and Kurt M. Marshek, "Fundamentals of Machine Design", 4th Edition, Wiley, 2005

Sundararajamoorthy T. V. Shanmugam .N, "Machine Design", Anuradha Publications, Chennai, 2015.

ME8501	METROLOGY AND MEASUREMENTS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To provide knowledge on various Metrological equipments available to measure the dimension of the components.
To provide knowledge on the correct procedure to be adopted to measure the dimension of the components.

UNIT I BASICS OF METROLOGY **9**

Introduction to Metrology – Need – Elements – Work piece, Instruments – Persons – Environment – their effect on Precision and Accuracy – Errors – Errors in Measurements – Types – Control – Types of standards.

UNIT II LINEAR AND ANGULAR MEASUREMENTS **9**

Linear Measuring Instruments – Evolution – Types – Classification – Limit gauges – gauge design – terminology – procedure – concepts of interchange ability and selective assembly – Angular measuring instruments – Types – Bevel protractor clinometers angle gauges, spirit levels sine bar – Angle alignment telescope – Autocollimator – Applications.

UNIT III ADVANCES IN METROLOGY 9

Basic concept of lasers Advantages of lasers – laser Interferometers – types – DC and AC Lasers interferometer – Applications – Straightness – Alignment. Basic concept of CMM – Types of CMM – Constructional features – Probes – Accessories – Software – Applications – Basic concepts of Machine Vision System – Element – Applications.

UNIT IV FORM MEASUREMENT 9

Principles and Methods of straightness – Flatness measurement – Thread measurement, gear measurement, surface finish measurement, Roundness measurement – Applications.

UNIT V MEASUREMENT OF POWER, FLOW AND TEMPERATURE 9

Force, torque, power - mechanical , Pneumatic, Hydraulic and Electrical type. Flow measurement: Venturimeter, Orifice meter, rotameter, pitot tube – Temperature: bimetallic strip, thermocouples, electrical resistance thermometer – Reliability and Calibration – Readability and Reliability.

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Describe the concepts of measurements to apply in various metrological instruments
CO2 Outline the principles of linear and angular measurement tools used for industrial applications
CO3 Explain the procedure for conducting computer aided inspection
CO4 Demonstrate the techniques of form measurement used for industrial components
CO5 Discuss various measuring techniques of mechanical properties in industrial applications

TEXT BOOKS:

Gupta. I.C., “Engineering Metrology”, Dhanpatrai Publications, 2005.
Jain R.K. “Engineering Metrology”, Khanna Publishers, 2009.

REFERENCES:

Alan S. Morris, “The essence of Measurement”, Prentice Hall of India 1996.
Beckwith, Marangoni, Lienhard, “Mechanical Measurements”, Pearson Education , 2014.
Charles Reginald Shotbolt, “Metrology for Engineers”, 5th edition, Cengage Learning EMEA,1990.
Donald Peckman, “Industrial Instrumentation”, Wiley Eastern, 2004.
Raghavendra ,Krishnamurthy “Engineering Metrology & Measurements”, Oxford Univ. Press, 2013.

ME8594 DYNAMICS OF MACHINES L T P C
4 0 0 4

OBJECTIVES:

To understand the force-motion relationship in components subjected to external forces and analysis of standard mechanisms.
To understand the undesirable effects of unbalances resulting from prescribed motions in mechanism.
To understand the effect of Dynamics of undesirable vibrations.
To understand the principles in mechanisms used for speed control and stability control.

UNIT I FORCE ANALYSIS 12

Dynamic force analysis – Inertia force and Inertia torque– D Alembert,s principle –Dynamic Analysis in reciprocating engines – Gas forces – Inertia effect of connecting rod– Bearing loads – Crank shaft torque – Turning moment diagrams –Fly Wheels – Flywheels of punching presses- Dynamics of Cam- follower mechanism.

UNIT II BALANCING 12

Static and dynamic balancing – Balancing of rotating masses – Balancing a single cylinder engine – Balancing of Multi-cylinder inline, V-engines – Partial balancing in engines – Balancing of linkages – Balancing machines-Field balancing of discs and rotors.

UNIT III FREE VIBRATION 12

Basic features of vibratory systems – Degrees of freedom – single degree of freedom – Free vibration– Equations of motion – Natural frequency – Types of Damping – Damped vibration–

Torsional vibration of shaft – Critical speeds of shafts – Torsional vibration – Two and three rotor torsional systems.

UNIT IV FORCED VIBRATION 12

Response of one degree freedom systems to periodic forcing – Harmonic disturbances – Disturbance caused by unbalance – Support motion –transmissibility – Vibration isolation vibration measurement.

UNIT V MECHANISM FOR CONTROL 12

Governors – Types – Centrifugal governors – Gravity controlled and spring controlled centrifugal governors – Characteristics – Effect of friction – Controlling force curves. Gyroscopes –Gyroscopic forces and torques – Gyroscopic stabilization – Gyroscopic effects in Automobiles, ships and airplanes.

TOTAL : 60 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Calculate static and dynamic forces of mechanisms.
CO2 Calculate the balancing masses and their locations of reciprocating and rotating masses.
CO3 Compute the frequency of free vibration.
CO4 Compute the frequency of forced vibration and damping coefficient.
CO5 Calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes.

TEXT BOOKS:

F. B. Sayyad, “Dynamics of Machinery”, McMillan Publishers India Ltd., Tech-Max Educational resources, 2011.

Rattan, S.S, “Theory of Machines”, 4th Edition, Tata McGraw-Hill, 2014.

3. Uicker, J.J., Pennock G.R and Shigley, J.E., “Theory of Machines and Mechanisms”, 4th Edition, Oxford University Press, 2014.

REFERENCES:

Cleghorn. W. L, “Mechanisms of Machines”, Oxford University Press, 2014

Ghosh. A and Mallick, A.K., “Theory of Mechanisms and Machines", 3rd Edition Affiliated East-West Pvt. Ltd., New Delhi, 2006.

Khurmi, R.S.,”Theory of Machines”, 14th Edition, S Chand Publications, 2005.

Rao.J.S. and Dukkipati.R.V. "Mechanisms and Machine Theory", Wiley-Eastern Ltd., New Delhi, 1992.

Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hill, 2009.

V.Ramamurthi, "Mechanics of Machines", Narosa Publishing House, 2002.

ME8511 **KINEMATICS AND DYNAMICS LABORATORY** **L T P C**
0 0 4 2

OBJECTIVES:

To supplement the principles learnt in kinematics and Dynamics of Machinery.
To understand how certain measuring devices are used for dynamic testing.

LIST OF EXPERIMENTS

a) Study of gear parameters.
Experimental study of velocity ratios of simple, compound, Epicyclic and differential gear trains.
a)Kinematics of Four Bar, Slider Crank, Crank Rocker, Double crank, Double rocker, Oscillating cylinder Mechanisms.
Kinematics of single and double universal joints.
a) Determination of Mass moment of inertia of Fly wheel and Axle system.
b)Determination of Mass Moment of Inertia of axisymmetric bodies using Turn Table apparatus. c) Determination of Mass Moment of Inertia using bifilar suspension and compound pendulum.
Motorized gyroscope – Study of gyroscopic effect and couple.
Governor - Determination of range sensitivity, effort etc., for Watts, Porter, Proell, and Hartnell Governors.
Cams – Cam profile drawing, Motion curves and study of jump phenomenon
a) Single degree of freedom Spring Mass System – Determination of natural
Frequency and verification of Laws of springs – Damping coefficient determination. b) Multi degree freedom suspension system – Determination of influence coefficient.
a) Determination of torsional natural frequency of single and Double Rotor systems.- Undamped and Damped Natural frequencies.
Vibration Absorber – Tuned vibration absorber.
Vibration of Equivalent Spring mass system – undamped and damped vibration.
Whirling of shafts – Determination of critical speeds of shafts with concentrated loads.
a) Balancing of rotating masses. (b) Balancing of reciprocating masses.
a) Transverse vibration of Free-Free beam – with and without concentrated masses. b) Forced Vibration of Cantilever beam – Mode shapes and natural frequencies.
c) Determination of transmissibility ratio using vibrating table.

TOTAL : 60 PERIODS

OUTCOMES

Upon the completion of this course the students will be able to

CO1 Explain gear parameters, kinematics of mechanisms, gyroscopic effect and working of lab equipments.

CO2 Determine mass moment of inertia of mechanical element, governor effort and range sensitivity, natural frequency and damping coefficient, torsional frequency, critical speeds of shafts, balancing mass of rotating and reciprocating masses, and transmissibility ratio.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Cam follower setup.	1 No.
2	Motorised gyroscope.	1 No.
3	Governor apparatus - Watt, Porter, Proell and Hartnell governors.	1 No.
4	Whirling of shaft apparatus.	1 No.
5	Dynamic balancing machine.	1 No.
6	Two rotor vibration setup.	1 No.
7	Spring mass vibration system.	1 No.

8	Torsional Vibration of single rotor system setup.	1 No.
9	Gear Models	1 No.
10	Kinematic Models to study various mechanisms.	1 No.
11	Turn table apparatus.	1 No.
12	Transverse vibration setup of a) cantilever	1 No.

ME8512 THERMAL ENGINEERING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

To study the value timing-V diagram and performance of IC Engines
To Study the characteristics of fuels/Lubricates used in IC Engines
To study the Performance of steam generator/ turbine
To study the heat transfer phenomena predict the relevant coefficient using implementation
To study the performance of refrigeration cycle / components

LIST OF EXPERIMENTS

I.C. ENGINE LAB

Valve Timing and Port Timing diagrams.
Actual p-v diagrams of IC engines.
Performance Test on 4 – stroke Diesel Engine.
Heat Balance Test on 4 – stroke Diesel Engine.
Morse Test on Multi-cylinder Petrol Engine.
Retardation Test on a Diesel Engine.
Determination of Flash Point and Fire Point of various fuels / lubricants.

STEAM LAB

Study on Steam Generators and Turbines.
Performance and Energy Balance Test on a Steam Generator.
Performance and Energy Balance Test on Steam Turbine.

HEAT TRANSFER LAB:

Thermal conductivity measurement using guarded plate apparatus.
Thermal conductivity measurement of pipe insulation using lagged pipe apparatus.
Determination of heat transfer coefficient under natural convection from a vertical cylinder.
Determination of heat transfer coefficient under forced convection from a tube.
Determination of Thermal conductivity of composite wall.
Determination of Thermal conductivity of insulating powder.
Heat transfer from pin-fin apparatus (natural & forced convection modes)
Determination of Stefan – Boltzmann constant.
Determination of emissivity of a grey surface.
Effectiveness of Parallel / counter flow heat exchanger.

REFRIGERATION AND AIR CONDITIONING LAB

Determination of COP of a refrigeration system
Experiments on Psychrometric processes
Performance test on a reciprocating air compressor
Performance test in a HC Refrigeration System
Performance test in a fluidized Bed Cooling Tower

TOTAL: 60 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials.

CO2 conduct tests on natural and forced convective heat transfer apparatus and evaluate heat transfer coefficient.

CO3 conduct tests on radiative heat transfer apparatus and evaluate Stefan Boltzmann constant and emissivity.

CO4 conduct tests to evaluate the performance of parallel/counter flow heat exchanger apparatus and reciprocating air compressor.

CO5 conduct tests to evaluate the performance of refrigeration and airconditioning test rigs.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

	NAME OF THE EQUIPMENT	Qty.
1	I.C Engine – 2 stroke and 4 stroke model	1 set
2	Apparatus for Flash and Fire Point	1 No.
3	4-stroke Diesel Engine with mechanical loading.	1 No
4	4-stroke Diesel Engine with hydraulic loading.	1 No.
5	4-stroke Diesel Engine with electrical loading.	1 No.
6	Multi-cylinder Petrol Engine	1 No.
7	Single cylinder Petrol Engine	1 No.
8	Data Acquisition system with any one of the above engines	1 No.
9	Steam Boiler with turbine setup	1 No.

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Guarded plate apparatus	1 No.
2	Lagged pipe apparatus	1 No.
3	Natural convection-vertical cylinder apparatus	1 No.
4	Forced convection inside tube apparatus	1 No.
5	Composite wall apparatus	1 No.
6	Thermal conductivity of insulating powder apparatus	1 No.
7	Pin-fin apparatus	1 No.
8	Stefan-Boltzmann apparatus	1 No.
9	Emissivity measurement apparatus	1 No.
10	Parallel/counter flow heat exchanger apparatus	1 No.
11	Single/two stage reciprocating air compressor	1 No.
12	Refrigeration test rig	1 No.
13	Air-conditioning test rig	1 No.

ME8513 METROLOGY AND MEASUREMENTS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVE:

To familiar with different measurement equipments and use of this industry for quality inspection.

LIST OF EXPERIMENTS

Calibration and use of measuring instruments – Vernier caliper, micrometer, Vernier height gauge – using gauge blocks

Calibration and use of measuring instruments – depth micrometer, bore gauge, telescopic gauge

Measurement of linear dimensions using Comparators

Measurement of angles using bevel protractor and sine bar

Measurement of screw thread parameters – Screw thread Micrometers and Three wire method ˆ(floating carriage micrometer)

Measurement of gear parameters – disc micrometers, gear tooth vernier caliper

Measurement of features in a prismatic component using Coordinate Measuring Machine (CMM)

Programming of CNC Coordinate Measuring Machines for repeated measurements of identical components

Non-contact (Optical) measurement using Toolmaker,s microscope / Profile projector and Video measurement system

Measurement of Surface finish in components manufactured using various processes (turning, milling, grinding, etc.,) using stylus based instruments.

Machine tool metrology – Level tests using precision level; Testing of straightness of a machine tool guide way using Autocollimator, spindle tests.

Measurement of force, torque and temperature

TOTAL: 60 PERIODS

OUTCOMES

Upon the completion of this course the students will be able to

CO1 Measure the gear tooth dimensions, angle using sine bar, straightness and flatness, thread parameters, temperature using thermocouple, force, displacement, torque and vibration.

CO2 Calibrate the vernier, micrometer and slip gauges and setting up the comparator for the inspection.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Micrometer	5
2	Vernier Caliper	5
3	Vernier Height Gauge	2
4	Vernier depth Gauge	2
5	Slip Gauge Set	1
6	Gear Tooth Vernier	1
7	Sine Bar	1
8	Floating Carriage Micrometer	1
9	Profile Projector / Tool Makers Microscope	1
10	Parallel / counter flow heat exchanger apparatus	1
11	Mechanical / Electrical / Pneumatic Comparator	1
12	Autocollimator	1
13	Temperature Measuring Setup	1
14	Force Measuring Setup	1
15	Torque Measuring Setup	1

16	Coordinate measuring machine	1
17	Surface finish measuring equipment	1
18	Bore gauge	1
19	Telescope gauge	1

ME8651 DESIGN OF TRANSMISSION SYSTEMS L T P C 3003

OBJECTIVES:

To gain knowledge on the principles and procedure for the design of Mechanical power Transmission components.

To understand the standard procedure available for Design of Transmission of Mechanical elements

To learn to use standard data and catalogues
(Use of P S G Design Data Book permitted)

UNIT I DESIGN OF FLEXIBLE ELEMENTS 9

Design of Flat belts and pulleys - Selection of V belts and pulleys – Selection of hoisting wire ropes and pulleys – Design of Transmission chains and Sprockets.

UNIT II SPUR GEARS AND PARALLEL AXIS HELICAL GEARS 9

Speed ratios and number of teeth-Force analysis -Tooth stresses - Dynamic effects – Fatigue strength - Factor of safety - Gear materials – Design of straight tooth spur & helical gears based on strength and wear considerations – Pressure angle in the normal and transverse plane-Equivalent number of teeth-forces for helical gears.

UNIT III BEVEL, WORM AND CROSS HELICAL GEARS 9

Straight bevel gear: Tooth terminology, tooth forces and stresses, equivalent number of teeth. Estimating the dimensions of pair of straight bevel gears. Worm Gear: Merits and demerits-terminology. Thermal capacity, materials-forces and stresses, efficiency, estimating the size of the worm gear pair. Cross helical: Terminology-helix angles-Estimating the size of the pair of cross helical gears.

UNIT IV GEAR BOXES 9

Geometric progression - Standard step ratio - Ray diagram, kinematics layout -Design of sliding mesh gear box - Design of multi speed gear box for machine tool applications - Constant mesh gear box - Speed reducer unit. – Variable speed gear box, Fluid Couplings, Torque Converters for automotive applications.

UNIT V CAMS, CLUTCHES AND BRAKES 9

Cam Design: Types-pressure angle and under cutting base circle determination-forces and surface stresses. Design of plate clutches –axial clutches-cone clutches-internal expanding rim clutches-Electromagnetic clutches. Band and Block brakes - external shoe brakes – Internal expanding shoe brake.

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 apply the concepts of design to belts, chains and rope drives.
CO2 apply the concepts of design to spur, helical gears.
CO3 apply the concepts of design to worm and bevel gears.
CO4 apply the concepts of design to gear boxes .
CO5 apply the concepts of design to cams, brakes and clutches

TEXT BOOKS:

Bhandari V, "Design of Machine Elements", 4th Edition, Tata McGraw-Hill Book Co, 2016.
Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett "Mechanical Engineering Design", 8th Edition, Tata McGraw-Hill, 2008.

REFERENCES:

Merhyle F. Spotts, Terry E. Shoup and Lee E. Hornberger, "Design of Machine Elements" 8th Edition, Printice Hall, 2003.
Orthwein W, "Machine Component Design", Jaico Publishing Co, 2003.
Prabhu. T.J., "Design of Transmission Elements", Mani Offset, Chennai, 2000.
Robert C. Juvinall and Kurt M. Marshek, "Fundamentals of Machine Design", 4th Edition, Wiley, 2005
Sundararajamoorthy T. V, Shanmugam .N, "Machine Design", Anuradha Publications, Chennai, 2003.

ME8691 COMPUTER AIDED DESIGN AND MANUFACTURING L T P C
3 0 0 3

OBJECTIVES:

To provide an overview of how computers are being used in mechanical component design
To understand the application of computers in various aspects of Manufacturing viz., Design, Proper planning, Manufacturing cost, Layout & Material Handling system.

UNIT I INTRODUCTION 9

Product cycle- Design process- sequential and concurrent engineering- Computer aided design – CAD system architecture- Computer graphics – co-ordinate systems- 2D and 3D transformations- homogeneous coordinates - Line drawing -Clipping- viewing transformation-Brief introduction to CAD and CAM – Manufacturing Planning, Manufacturing control- Introduction to CAD/CAM –CAD/CAM concepts —Types of production - Manufacturing models and Metrics – Mathematical models of Production Performance

UNIT II GEOMETRIC MODELING 9

Representation of curves- Hermite curve- Bezier curve- B-spline curves-rational curves-Techniques for surface modeling – surface patch- Coons and bicubic patches- Bezier and B-spline surfaces. Solid modeling techniques- CSG andB-rep

UNIT III CAD STANDARDS 9

Standards for computer graphics- Graphical Kernel System (GKS) - standards for exchange images- Open Graphics Library (OpenGL) - Data exchange standards - IGES, STEP, CALS etc. - communication standards.

UNIT IV FUNDAMENTAL OF CNC AND PART PROGRAMING 9 Introduction to NC systems and CNC - Machine axis and Co-ordinate system- CNC machine tools-

Principle of operation CNC- Construction features including structure- Drives and CNC controllers-2D and 3D machining on CNC- Introduction of Part Programming, types - Detailed Manual part

programming on Lathe & Milling machines using G codes and M codes- Cutting Cycles, Loops, Sub program and Macros- Introduction of CAM package.

UNIT V **CELLULAR MANUFACTURING AND FLEXIBLE MANUFACTURING SYSTEM (FMS)** **9**

Group Technology(GT),Part Families–Parts Classification and coding–Simple Problems in Opitz Part Coding system–Production flow Analysis–Cellular Manufacturing–Composite part concept– Types of Flexibility - FMS – FMS Components – FMS Application & Benefits – FMS Planning and Control– Quantitative analysis in FMS

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics

CO2 Explain the fundamentals of parametric curves, surfaces and Solids

CO3 Summarize the different types of Standard systems used in CAD

CO4 Apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines

CO5 Summarize the different types of techniques used in Cellular Manufacturing and FMS

TEXT BOOKS:

Ibrahim Zeid “Mastering CAD CAM” Tata McGraw-Hill PublishingCo.2007

Mikell.P.Groover “Automation, Production Systems and Computer Integrated Manufacturing”, Prentice Hall of India, 2008.

Radhakrishnan P, SubramanyanS.andRaju V., “CAD/CAM/CIM”, 2nd Edition, New Age International (P) Ltd, New Delhi,2000.

REFERENCES:

Chris McMahon and Jimmie Browne “CAD/CAM Principles", "Practice and Manufacturing management “ Second Edition, Pearson Education, 1999.

Donald Hearn and M. Pauline Baker “Computer Graphics”,. Prentice Hall, Inc,1992.

Foley, Wan Dam, Feiner and Hughes - "Computer graphics principles & practice" Pearson Education -2003

William M Neumann and Robert F.Sproul “Principles of Computer Graphics”, McGraw Hill Book Co. Singapore, 1989.

ME8693 HEAT AND MASS TRANSFER

L	T	P	C
3	2	0	4

OBJECTIVES:

To understand the mechanisms of heat transfer under steady and transient conditions.

To understand the concepts of heat transfer through extended surfaces.

To learn the thermal analysis and sizing of heat exchangers and to understand the basic concepts of mass transfer. (Use of standard HMT data book permitted)

UNIT I CONDUCTION **9+6**

General Differential equation of Heat Conduction– Cartesian and Polar Coordinates – One Dimensional Steady State Heat Conduction –– plane and Composite Systems – Conduction with Internal Heat Generation – Extended Surfaces – Unsteady Heat Conduction – Lumped Analysis – Semi Infinite and Infinite Solids –Use of Heisler,s charts.

UNIT II CONVECTION 9+6

Free and Forced Convection - Hydrodynamic and Thermal Boundary Layer. Free and Forced Convection during external flow over Plates and Cylinders and Internal flow through tubes .

UNIT III PHASE CHANGE HEAT TRANSFER AND HEAT EXCHANGERS 9+6

Nusselt,s theory of condensation - Regimes of Pool boiling and Flow boiling. Correlations in boiling and condensation. Heat Exchanger Types - Overall Heat Transfer Coefficient – Fouling Factors - Analysis – LMTD method - NTU method.

UNIT IV RADIATION 9+6

Black Body Radiation – Grey body radiation - Shape Factor – Electrical Analogy – Radiation Shields. Radiation through gases.

UNIT V MASS TRANSFER 9+6

Basic Concepts – Diffusion Mass Transfer – Fick,s Law of Diffusion – Steady state Molecular Diffusion – Convective Mass Transfer – Momentum, Heat and Mass Transfer Analogy – Convective Mass Transfer Correlations.

TOTAL : 75 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems

CO2 Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems

CO3 Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems

CO4 Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems

CO5 Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications

TEXT BOOKS:

Holman, J.P., "Heat and Mass Transfer", Tata McGraw Hill, 2000

Yunus A. Cengel, "Heat Transfer A Practical Approach", Tata McGraw Hill, 5th Edition 2015

REFERENCES:

Frank P. Incropera and David P. Dewitt, "Fundamentals of Heat and Mass Transfer", John Wiley & Sons, 1998.

Kothandaraman, C.P., "Fundamentals of Heat and Mass Transfer", New Age International, New Delhi, 1998.

Nag, P.K., "Heat Transfer", Tata McGraw Hill, New Delhi, 2002

Ozisik, M.N., "Heat Transfer", McGraw Hill Book Co., 1994.

R.C. Sachdeva, “Fundamentals of Engineering Heat & Mass transfer”, New Age International Publishers, 2009

ME8692 **FINITE ELEMENT ANALYSIS** **L T P C**
3 0 0 3

OBJECTIVES:

To introduce the concepts of Mathematical Modeling of Engineering Problems.
To appreciate the use of FEM to a range of Engineering Problems.

UNIT I INTRODUCTION **9**

Historical Background – Mathematical Modeling of field problems in Engineering – Governing Equations – Discrete and continuous models – Boundary, Initial and Eigen Value problems– Weighted Residual Methods – Variational Formulation of Boundary Value Problems – Ritz Technique – Basic concepts of the Finite Element Method.

UNIT II ONE-DIMENSIONAL PROBLEMS **9**

One Dimensional Second Order Equations – Discretization – Element types- Linear and Higher order Elements – Derivation of Shape functions and Stiffness matrices and force vectors- Assembly of Matrices - Solution of problems from solid mechanics and heat transfer. Longitudinal vibration frequencies and mode shapes. Fourth Order Beam Equation –Transverse deflections and Natural frequencies of beams.

UNIT III TWO DIMENSIONAL SCALAR VARIABLE PROBLEMS **9**

Second Order 2D Equations involving Scalar Variable Functions – Variational formulation –Finite Element formulation – Triangular elements – Shape functions and element matrices and vectors. Application to Field Problems - Thermal problems – Torsion of Non circular shafts –Quadrilateral elements – Higher Order Elements.

UNIT IV TWO DIMENSIONAL VECTOR VARIABLE PROBLEMS **9**

Equations of elasticity – Plane stress, plane strain and axisymmetric problems – Body forces and temperature effects – Stress calculations - Plate and shell elements.

UNIT V ISOPARAMETRIC FORMULATION **9**

Natural co-ordinate systems – Isoparametric elements – Shape functions for iso parametric elements – One and two dimensions – Serendipity elements – Numerical integration and application to plane stress problems - Matrix solution techniques – Solutions Techniques to Dynamic problems – Introduction to Analysis Software.

TOTAL : 45 PERIODS

OUTCOMES

CO1 Summarize the basics of finite element formulation.
CO2 Apply finite element formulations to solve one dimensional Problems.
CO3 Apply finite element formulations to solve two dimensional scalar Problems.
CO4 Apply finite element method to solve two dimensional Vector problems.
CO5 Apply finite element method to solve problems on iso parametric element and dynamic Problems.

TEXT BOOKS:

Reddy. J.N., “An Introduction to the Finite Element Method”, 3rd Edition, Tata McGraw-Hill, 2005
Seshu, P, “Text Book of Finite Element Analysis”, Prentice-Hall of India Pvt. Ltd., New Delhi, 2007.

REFERENCES:

Bhatti Asghar M, "Fundamental Finite Element Analysis and Applications", John Wiley & Sons, 2005 (Indian Reprint 2013)*

Chandrupatla & Belagundu, “Introduction to Finite Elements in Engineering”, 3rd Edition, Prentice Hall College Div, 1990

Logan, D.L., “A first course in Finite Element Method”, Thomson Asia Pvt. Ltd., 2002

Rao, S.S., “The Finite Element Method in Engineering”, 3rd Edition, Butterworth Heinemann, 2004

Robert D. Cook, David S. Malkus, Michael E. Plesha, Robert J. Witt, “Concepts and Applications of Finite Element Analysis”, 4th Edition, Wiley Student Edition, 2002.

ME8694	HYDRAULICS AND PNEUMATICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To provide student with knowledge on the application of fluid power in process, construction and manufacturing Industries.

To provide students with an understanding of the fluids and components utilized in modern industrial fluid power system.

To develop a measurable degree of competence in the design, construction and operation of fluid power circuits.

UNIT I FLUID POWER PRINICIPLES AND HYDRAULIC PUMPS 9

Introduction to Fluid power – Advantages and Applications – Fluid power systems – Types of fluids - Properties of fluids and selection – Basics of Hydraulics – Pascal,s Law – Principles of flow - Friction loss – Work, Power and Torque Problems, Sources of Hydraulic power : Pumping Theory – Pump Classification – Construction, Working, Design, Advantages, Disadvantages, Performance, Selection criteria of Linear and Rotary – Fixed and Variable displacement pumps – Problems.

UNIT II HYDRAULIC ACTUATORS AND CONTROL COMPONENTS 9

Hydraulic Actuators: Cylinders – Types and construction, Application, Hydraulic cushioning – Hydraulic motors - Control Components : Direction Control, Flow control and pressure control valves – Types, Construction and Operation – Servo and Proportional valves – Applications – Accessories : Reservoirs, Pressure Switches – Applications – Fluid Power ANSI Symbols – Problems.

UNIT III HYDRAULIC CIRCUITS AND SYSTEMS 9

Accumulators, Intensifiers, Industrial hydraulic circuits – Regenerative, Pump Unloading, Double-Pump, Pressure Intensifier, Air-over oil, Sequence, Reciprocation, Synchronization, Fail-Safe, Speed Control, Hydrostatic transmission, Electro hydraulic circuits, Mechanical hydraulic servo systems.

UNIT IV PNEUMATIC AND ELECTRO PNEUMATIC SYSTEMS 9

Properties of air – Perfect Gas Laws – Compressor – Filters, Regulator, Lubricator, Muffler, Air control Valves, Quick Exhaust Valves, Pneumatic actuators, Design of Pneumatic circuit – Cascade method – Electro Pneumatic System – Elements – Ladder diagram – Problems, Introduction to fluidics and pneumatic logic circuits.

UNIT V TROUBLE SHOOTING AND APPLICATIONS 9

Installation, Selection, Maintenance, Trouble Shooting and Remedies in Hydraulic and Pneumatic systems, Design of hydraulic circuits for Drilling, Planning, Shaping, Surface grinding, Press and Forklift applications. Design of Pneumatic circuits for Pick and Place applications and tool handling in CNC Machine tools – Low cost Automation – Hydraulic and Pneumatic power packs.

TOTAL:45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the Fluid power and operation of different types of pumps.
CO2 Summarize the features and functions of Hydraulic motors, actuators and Flow control valves
CO3 Explain the different types of Hydraulic circuits and systems
CO4 Explain the working of different pneumatic circuits and systems
CO5 Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems.

TEXT BOOKS:

1. Anthony Esposito, “Fluid Power with Applications”, Pearson Education 2005.
2. Majumdar S.R., “Oil Hydraulics Systems- Principles and Maintenance”, Tata McGraw-Hill, 2001.

REFERENCES:

Anthony Lal, “Oil hydraulics in the service of industry”, Allied publishers, 1982.
Dudelyt, A. Pease and John T. Pippenger, “Basic Fluid Power”, Prentice Hall, 1987.
Majumdar S.R., “Pneumatic systems – Principles and maintenance”, Tata McGraw Hill, 1995
Michael J, Prinches and Ashby J. G, “Power Hydraulics”, Prentice Hall, 1989.
Shanmugasundaram.K, “Hydraulic and Pneumatic controls”, Chand & Co, 2006.

ME8681 CAD / CAM LABORATORY L T P C

0 0 4 2

OBJECTIVES:

To gain practical experience in handling 2D drafting and 3D modelling software systems.
To study the features of CNC Machine Tool.
To expose students to modern control systems (Fanuc, Siemens etc.,)
To know the application of various CNC machines like CNC lathe, CNC Vertical Machining centre, CNC EDM and CNC wire-cut and studying of Rapid prototyping.

LIST OF EXPERIMENTS

1. 3D GEOMETRIC MODELLING 30 PERIODS List of Experiments

1. Introduction of 3D Modelling software

Creation of 3D assembly model of following machine elements using 3D Modelling software

Flange Coupling
Plummer Block
Screw Jack
Lathe Tailstock
Universal Joint
Machine Vice
Stuffing box
Crosshead

Safety Valves
Non-return valves
Connecting rod
Piston
Crankshaft

* Students may also be trained in manual drawing of some of the above components

2. Manual Part Programming. **30 PERIODS**

Part Programming - CNC Machining Centre a) Linear Cutting. b) Circular cutting. c) Cutter Radius Compensation. d) Canned Cycle Operations.

Part Programming - CNC Turning Centre a) Straight, Taper and Radius Turning. b) Thread Cutting. c) Rough and Finish Turning Cycle. d) Drilling and Tapping Cycle.

3. Computer Aided Part Programming

CL Data and Post process generation using CAM packages.
Application of CAPP in Machining and Turning Centre.

TOTAL: 60 PERIODS

OUTCOMES

CO1 Draw 3D and Assembly drawing using CAD software
CO2 Demonstrate manual part programming with G and M codes using CAM

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	Description of Equipment	Qty
HARDWARE		
1.	Computer Server	1
2.	Computer nodes or systems (High end CPU with atleast 1 GB main memory) networked to the server	30
3.	A3 size plotter	1
4.	Laser Printer	1
5.	CNC Lathe	1
6.	CNC milling machine	1
SOFTWARE		
7.	Any High end integrated modeling and manufacturing CAD / CAM software	15 licenses
8.	CAM Software for machining centre and turning centre (CNC Programming and tool path simulation for FANUC / Sinumeric and Heidenhain controller)	15 licenses
9.	Licensed operating system	Adequate
10.	Support for CAPP	Adequate

ME8682	DESIGN AND FABRICATION PROJECT	L	T	P	C
		0	0	4	2

OBJECTIVE:

The main objective is to give an opportunity to the student to get hands on training in the fabrication of one or more components of a complete working model, which is designed by them.

GUIDELINE FOR REVIEW AND EVALUATION

The students may be grouped into 2 to 4 and work under a project supervisor. The device/ system/component(s) to be fabricated may be decided in consultation with the supervisor and if possible with an industry. A project report to be submitted by the group and the fabricated model, which will be reviewed and evaluated for internal assessment by a Committee constituted by the Head of the Department. At the end of the semester examination the project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL : 60 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 design and Fabricate the machine element or the mechanical product.

CO2 demonstrate the working model of the machine element or the mechanical product.

HS8581	PROFESSIONAL COMMUNICATION	L	T	P	C
		0	0	2	1

OBJECTIVES: The course aims to:

Enhance the Employability and Career Skills of students

Orient the students towards grooming as a professional

Make them Employable Graduates

Develop their confidence and help them attend interviews successfully.

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes

TOTAL : 30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:

Make effective presentations
Participate confidently in Group Discussions.
Attend job interviews and be successful in them.
Develop adequate Soft Skills required for the workplace

Recommended Software

Open Source Software
Win English

REFERENCES:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015
E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.
Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014
S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

ME8792	POWER PLANT ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE:

Providing an overview of Power Plants and detailing the role of Mechanical Engineers in their operation and maintenance.

UNIT I COAL BASED THERMAL POWER PLANTS 9 Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers,

FBC Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants – Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration systems.

UNIT II DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS 9

Otto, Diesel, Dual & Brayton Cycle - Analysis & Optimisation. Components of Diesel and Gas Turbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cycle systems.

UNIT III NUCLEAR POWER PLANTS 9

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors : Boil*ing Water Reactor* (BWR), P*ressurized Water Reactor* (PWR), CANada Deuterium- Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

UNIT IV POWER FROM RENEWABLE ENERGY 9

Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, *Solar* Photo Voltaic (SPV), Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.

UNIT V ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS 9

Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the layout, construction and working of the components inside a thermal power plant.

CO2 Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.

CO3 Explain the layout, construction and working of the components inside nuclear power plants.

CO4 Explain the layout, construction and working of the components inside Renewable energy power plants.

CO5 Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.

TEXT BOOK:

Nag. P.K., "Power Plant Engineering", Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008.

REFERENCES:

El-Wakil. M.M., "Power Plant Technology", Tata McGraw – Hill Publishing Company Ltd., 2010.

Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.

Thomas C. Elliott, Kao Chen and Robert C. Swanekamp, "Power Plant Engineering", Second Edition, Standard Handbook of McGraw – Hill, 1998.

ME8793 PROCESS PLANNING AND COST ESTIMATION

L	T	P	C
3	0	0	3

OBJECTIVE:

To introduce the process planning concepts to make cost estimation for various products after process planning

UNIT I INTRODUCTION TO PROCESS PLANNING 9

Introduction- methods of process planning-Drawing interpretation-Material evaluation – steps in process selection-.Production equipment and tooling selection

UNIT II PROCESS PLANNING ACTIVITIES 9

Process parameters calculation for various production processes-Selection jigs and fixtures election of quality assurance methods - Set of documents for process planning-Economics of process planning- case studies

UNIT III INTRODUCTION TO COST ESTIMATION 9

Importance of costing and estimation –methods of costing-elements of cost estimation –Types of estimates – Estimating procedure- Estimation labor cost, material cost- allocation of over head charges- Calculation of depreciation cost

UNIT IV PRODUCTION COST ESTIMATION 9

Estimation of Different Types of Jobs - Estimation of Forging Shop, Estimation of Welding Shop, Estimation of Foundry Shop

UNIT V MACHINING TIME CALCULATION 9

Estimation of Machining Time - Importance of Machine Time Calculation- Calculation of Machining Time for Different Lathe Operations ,Drilling and Boring - Machining Time Calculation for Milling, Shaping and Planning -Machining Time Calculation for Grinding.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 select the process, equipment and tools for various industrial products.
CO2 prepare process planning activity chart.
CO3 explain the concept of cost estimation.
CO4 compute the job order cost for different type of shop floor.
CO5 calculate the machining time for various machining operations.

TEXT BOOKS:

Peter scalon, “Process planning, Design/Manufacture Interface”, Elsevier science technology Books, Dec 2002.
Sinha B.P, “Mechanical Estimating and Costing”, Tata-McGraw Hill publishing co, 1995.

REFERENCES:

Chitale A.V. and Gupta R.C., “Product Design and Manufacturing”, 2nd Edition, PHI, 2002.
Ostwalal P.F. and Munez J., “Manufacturing Processes and systems”, 9th Edition, John Wiley, 1998.
Russell R.S and Tailor B.W, “Operations Management”, 4th Edition, PHI, 2003.
Mikell P. Groover, “Automation, Production, Systems and Computer Integrated Manufacturing”, Pearson Education 2001.
K.C. Jain & L.N. Aggarwal, “Production Planning Control and Industrial Management”, Khanna Publishers 1990.

ME8791	MECHATRONICS	L	T	P	C
		3	0	0	3

OBJECTIVE:

To impart knowledge about the elements and techniques involved in Mechatronics systems which are very much essential to understand the emerging field of automation.

UNIT I INTRODUCTION 9

Introduction to Mechatronics – Systems – Concepts of Mechatronics approach – Need for Mechatronics – Emerging areas of Mechatronics – Classification of Mechatronics. Sensors and Transducers**:** Static and dynamic Characteristics of Sensor, Potentiometers – LVDT – Capacitance sensors – Strain gauges – Eddy current sensor – Hall effect sensor – Temperature sensors – Light sensors

UNIT II MICROPROCESSOR AND MICROCONTROLLER 9

Introduction – Architecture of 8085 – Pin Configuration – Addressing Modes –Instruction set, Timing diagram of 8085 – Concepts of 8051 microcontroller – Block diagram,.

UNIT III PROGRAMMABLE PERIPHERAL INTERFACE 9

Introduction – Architecture of 8255, Keyboard interfacing, LED display –interfacing, ADC and DAC interface, Temperature Control – Stepper Motor Control – Traffic Control interface.

UNIT IV PROGRAMMABLE LOGIC CONTROLLER 9

Introduction – Basic structure – Input and output processing – Programming – Mnemonics – Timers, counters and internal relays – Data handling – Selection of PLC.

UNIT V ACTUATORS AND MECHATRONIC SYSTEM DESIGN 9

Types of Stepper and Servo motors – Construction – Working Principle – Advantages and Disadvantages. Design process-stages of design process – Traditional and Mechatronics design concepts – Case studies of Mechatronics systems – Pick and place Robot – Engine Management system – Automatic car park barrier.

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical, Electronic Systems and sensor technology.

CO2 Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of Microprocessor and Microcontroller.

CO3 Discuss Programmable Peripheral Interface, Architecture of 8255 PPI, and various device interfacing

CO4 Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of Mechatronic engineering.

CO5 Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies

TEXT BOOKS:

Bolton, “Mechatronics”, Prentice Hall, 2008

Ramesh S Gaonkar, “Microprocessor Architecture, Programming, and Applications with the 8085”, 5th Edition, Prentice Hall, 2008.

REFERENCES:

Bradley D.A, Dawson D, Buru N.C and Loader A.J, “Mechatronics”, Chapman and Hall, 1993.

Clarence W, de Silva, "Mechatronics" CRC Press, First Indian Re-print, 2013

Devadas Shetty and Richard A. Kolk, “Mechatronics Systems Design”, PWS publishing company, 2007.

Krishna Kant, “Microprocessors & Microcontrollers”, Prentice Hall of India, 2007.

Michael B.Histand and Davis G.Alciatore, “Introduction to Mechatronics and Measurement systems”, McGraw Hill International edition, 2007.

ME8711	SIMULATION AND ANALYSIS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

To give exposure to software tools needed to analyze engineering problems.
To expose the students to different applications of simulation and analysis tools.

LIST OF EXPERIMENTS A. SIMULATION

MATLAB basics, Dealing with matrices, Graphing-Functions of one variable and two variables
Use of Matlab to solve simple problems in vibration
Mechanism Simulation using Multibody Dynamic software

B. ANALYSIS

Force and Stress analysis using link elements in Trusses, cables etc.
Stress and deflection analysis in beams with different support conditions.
Stress analysis of flat plates and simple shells.
Stress analysis of axi – symmetric components.
Thermal stress and heat transfer analysis of plates.
Thermal stress analysis of cylindrical shells.
Vibration analysis of spring-mass systems.
Model analysis of Beams.
Harmonic, transient and spectrum analysis of simple systems.

TOTAL: 60 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 simulate the working principle of air conditioning system, hydraulic and pneumatic cylinder and cam follower mechanisms using MATLAB.
CO2 analyze the stresses and strains induced in plates, brackets and beams and heat transfer problems.
CO3 calculate the natural frequency and mode shape analysis of 2D components and beams.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. NO.	NAME OF THE EQUIPMENT	Qty.
1	Computer Work Station	15
2	Color Desk Jet Printer	01
3	Multibody Dynamic Software Suitable for Mechanism simulation and analysis	15 licenses
4	C / MATLAB	5 licenses

ME8781 **MECHATRONICS LABORATORY** **L T P C**
0 0 4 2

OBJECTIVE:

To know the method of programming the microprocessor and also the design, modeling & analysis of basic electrical, hydraulic & pneumatic Systems which enable the students to understand the concept of mechatronics.

LIST OF EXPERIMENTS:

1. Assembly language programming of 8085 – Addition – Subtraction – Multiplication – Division – Sorting – Code Conversion.

Stepper motor interface.
Traffic light interface.
Speed control of DC motor.
Study of various types of transducers.
Study of hydraulic, pneumatic and electro-pneumatic circuits.
Modelling and analysis of basic hydraulic, pneumatic and electrical circuits using Software.
Study of PLC and its applications.
Study of image processing technique.

TOTAL: 60 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Demonstrate the functioning of mechatronics system with various pneumatic, hydraulic and electrical systems.

CO2 Demonstrate the functioning of control systems with the help of PLC and microcontrollers.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

Sl. No.	NAME OF THE EQUIPMENT	Qty.
1	Basic Pneumatic Trainer Kit with manual and electrical controls/ PLC Control each	1 No.
2	Basic Hydraulic Trainer Kit	1 No
3	Hydraulics and Pneumatics Systems Simulation Software	10 No
4	8051 - Microcontroller kit with stepper motor and drive circuit sets	2 No
5	Image processing system with hardware & software	1 No.

ME8712 **TECHNICAL SEMINAR** **L T P C**
0 0 2 1

To enrich the communication skills of the student and presentations of technical topics of interest, this course is introduced. In this course, a student has to present three Technical papers or recent advances in engineering/technology that will be evaluated by a Committee constituted by the Head of the Department.

TOTAL: 30 PERIODS

MG8591 PRINCIPLES OF MANAGEMENT L T P C 3003

OBJECTIVE:

To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9 Nature and purpose of planning – planning process – types of planning – objectives –
setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING 9

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V CONTROLLING 9

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOME:

- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXT BOOKS:

JAF Stoner, Freeman R.E and Daniel R Gilbert “Management”, 6th Edition, Pearson Education, 2004.

Stephen P. Robbins & Mary Coulter, “Management”, Prentice Hall (India)Pvt. Ltd., 10th Edition, 2009.

REFERENCES:

Harold Koontz & Heinz Weihrich, “Essentials of Management”, Tata McGraw Hill, 1998.

Robert Kreitner & Mamata Mohapatra, “Management”, Biztantra, 2008.

Stephen A. Robbins & David A. Decenzo & Mary Coulter, “Fundamentals of Management”, 7th Edition, Pearson Education, 2011.

Tripathy PC & Reddy PN, “Principles of Management”, Tata Mcgraw Hill, 1999

ME8811	PROJECT WORK	L	T	P	C
		0	0	20	10

OBJECTIVE:

To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 300 PERIODS

OUTCOME:

On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

ME8091	AUTOMOBILE ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the construction and working principle of various parts of an automobile.

To have the practice for assembling and dismantling of engine parts and transmission system

UNIT I VEHICLE STRUCTURE AND ENGINES 9

Types of automobiles vehicle construction and different layouts, chassis, frame and body, Vehicle aerodynamics (various resistances and moments involved), IC engines –components-functions and materials, variable valve timing (VVT).

UNIT II ENGINE AUXILIARY SYSTEMS 9 Electronically controlled gasoline injection system for SI engines, Electronically controlled diesel injection system (Unit injector system, Rotary distributor type

and common rail direct injection system), Electronic ignition system (Transistorized coil ignition system, capacitive discharge ignition system), Turbo chargers (WGT, VGT), Engine emission control by three way catalytic converter system, Emission norms (Euro and BS).

UNIT III TRANSMISSION SYSTEMS 9

Clutch-types and construction, gear boxes- manual and automatic, gear shift mechanisms, Over drive, transfer box, fluid flywheel, torque converter, propeller shaft, slip joints, universal joints, Differential and rear axle, Hotchkiss Drive and Torque Tube Drive.

UNIT IV STEERING, BRAKES AND SUSPENSION SYSTEMS 9 Steering geometry and types of steering gear box-Power Steering, Types of Front Axle, Types of

Suspension Systems, Pneumatic and Hydraulic Braking Systems, Antilock Braking System (ABS), electronic brake force distribution (EBD) and Traction Control.

UNIT V ALTERNATIVE ENERGY SOURCES 9 Use of Natural Gas, Liquefied Petroleum Gas, Bio-diesel, Bio-ethanol, Gasohol

and Hydrogen in Automobiles- Engine modifications required –Performance, Combustion and Emission Characteristics of SI and CI engines with these alternate fuels - Electric and Hybrid Vehicles, Fuel Cell Note: Practical Training in dismantling and assembling of Engine parts and Transmission Systems should be given to the students.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 recognize the various parts of the automobile and their functions and materials.
CO2 discuss the engine auxiliary systems and engine emission control.
CO3 distinguish the working of different types of transmission systems.
CO4 explain the Steering, Brakes and Suspension Systems.
CO5 predict possible alternate sources of energy for IC Engines.

TEXT BOOKS:

Jain K.K. and Asthana .R.B, “Automobile Engineering” Tata McGraw Hill Publishers, New Delhi, 2002.

Kirpal Singh, “Automobile Engineering”, Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 13th Edition 2014..

REFERENCES:

Ganesan V. “Internal Combustion Engines”, Third Edition, Tata McGraw-Hill, 2012.

Heinz Heisler, “Advanced Engine Technology,” SAE International Publications USA, 1998.

Joseph Heitner, “Automotive Mechanics,” Second Edition, East-West Press, 1999.

Martin W, Stockel and Martin T Stockle , “Automotive Mechanics Fundamentals,” The Good heart - Will Cox Company Inc, USA ,1978.

Newton ,Steeds and Garet, “Motor Vehicles”, Butterworth Publishers,1989.

PR8592 WELDING TECHNOLOGY LTPC
3 0 0 3

OBJECTIVE:

To understand the basics of welding and to know about the various types of welding processes

UNIT I GAS AND ARC WELDING PROCESSES: 9

Fundamental principles – Air Acetylene welding, Oxyacetylene welding, Carbon arc welding, Shielded metal arc welding, Submerged arc welding, TIG & MIG welding, Plasma arc welding and Electroslag welding processes - advantages, limitations and applications.

UNIT II RESISTANCE WELDING PROCESSES: 9

Spot welding, Seam welding, Projection welding, Resistance Butt welding, Flash Butt welding, Percussion welding and High frequency resistance welding processes - advantages, limitations and applications.

UNIT III SOLID STATE WELDING PROCESSES: 9

Cold welding, Diffusion bonding, Explosive welding, Ultrasonic welding, Friction welding, Forge welding, Roll welding and Hot pressure welding processes - advantages, limitations and applications.

UNIT IV OTHER WELDING PROCESSES: 9

Thermit welding, Atomic hydrogen welding, Electron beam welding, Laser Beam welding, Friction stir welding, Under Water welding, Welding automation in aerospace, nuclear and surface transport vehicles.

UNIT V DESIGN OF WELD JOINTS, WELDABILITY AND TESTING OF WELDMENTS 9

Various weld joint designs – Welding defects – causes and remedies - Weldability of Aluminium, Copper, and Stainless steels. Destructive and non destructive testing of weldments.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the students can able

Understand the construction and working principles of gas and arc welding process.
Understand the construction and working principles of resistance welding process.
Understand the construction and working principles of various solid state welding process.
Understand the construction and working principles of various special welding processes.
Understand the concepts on weld joint design, weldability and testing of weldments.

TEXT BOOKS

Little R.L., "Welding and welding Technology", Tata McGraw Hill Publishing Co., Ltd., New Delhi, 34th reprint, 2008.
Parmer R.S., "Welding Engineering and Technology", 1st Edition, Khanna Publishers, New Delhi, 2008.
Parmer R.S., "Welding Processes and Technology", Khanna Publishers, New Delhi, 1992.

REFERENCES

AWS- Welding Hand Book. 8th Edition. Vol- 2. "Welding Process"
Christopher Davis. "Laser Welding- Practical Guide". Jaico Publishing House.
Davis A.C., "The Science and Practice of Welding", Cambridge University Press, Cambridge, 1993
Nadkarni S.V. "Modern Arc Welding Technology", Oxford IBH Publishers, 1st Edition, 2005.
Schwartz M.M. "Metals Joining Manual". McGraw Hill Books, 1979.
Tylecote R.F. "The Solid Phase Welding of Metals". Edward Arnold Publishers Ltd. London.

ME8096	GAS DYNAMICS AND JET PROPULSION	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the basic difference between incompressible and compressible flow.
To understand the phenomenon of shock waves and its effect on flow. To gain some basic knowledge about jet propulsion and Rocket Propulsion.
(Use of Standard Gas Tables permitted)

UNIT I BASIC CONCEPTS AND ISENTROPIC FLOWS 9

Energy and momentum equations of compressible fluid flows – Stagnation states, Mach waves and Mach cone – Effect of Mach number on compressibility – Isentropic flow through variable ducts – Nozzle and Diffusers

UNIT II FLOW THROUGH DUCTS 9

Flows through constant area ducts with heat transfer (Rayleigh flow) and Friction (Fanno flow) – variation of flow properties.

UNIT III NORMAL AND OBLIQUE SHOCKS 9

Governing equations – Variation of flow parameters across the normal and oblique shocks – Prandtl – Meyer relations – Applications.

UNIT IV JET PROPULSION 9

Theory of jet propulsion – Thrust equation – Thrust power and propulsive efficiency – Operating principle, cycle analysis and use of stagnation state performance of ram jet, turbojet, turbofan and turbo prop engines.

UNIT V SPACE PROPULSION 9

Types of rocket engines – Propellants-feeding systems – Ignition and combustion – Theory of rocket propulsion – Performance study – Staging – Terminal and characteristic velocity – Applications – space flights.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Apply the concept of compressible flows in variable area ducts.
CO2 Apply the concept of compressible flows in constant area ducts.
CO3 examine the effect of compression and expansion waves in compressible flow.
CO4 use the concept of gas dynamics in Jet Propulsion.
CO5 apply the concept of gas dynamics in Space Propulsion.

TEXT BOOKS:

Anderson, J.D., "Modern Compressible flow", 3rd Edition, McGraw Hill, 2012.

Yahya, S.M. "Fundamentals of Compressible Flow", New Age International (P) Limited, New Delhi, 2002.

REFERENCES:

Cohen. H., G.E.C. Rogers and Saravanamutto, "Gas Turbine Theory", Longman Group Ltd.,1980

Ganesan. V., "Gas Turbines", Tata McGraw Hill Publishing Co., New Delhi, 2010.

Shapiro. A.H.," Dynamics and Thermodynamics of Compressible fluid Flow", John wiley, New York, 1953.

Sutton. G.P., "Rocket Propulsion Elements", John wiley, New York,2010,.

Zucrow. N.J., "Principles of Jet Propulsion and Gas Turbines", John Wiley, New York, 1970.

GE8075 INTELLECTUAL PROPERTY RIGHTS L T P C
3 0 0 3

OBJECTIVE:

To give an idea about IPR, registration and its enforcement.

UNIT I INTRODUCTION 9

Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II REGISTRATION OF IPRs 10

Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad

UNIT III AGREEMENTS AND LEGISLATIONS 10

International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT IV DIGITAL PRODUCTS AND LAW 9

Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection – Unfair Competition – Meaning and Relationship between Unfair Competition and IP Laws – Case Studies.

UNIT V ENFORCEMENT OF IPRs 7

Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

TOTAL :45 PERIODS

OUTCOME:

Ability to manage Intellectual Property portfolio to enhance the value of the firm.

TEXT BOOKS

S.V. Satarkar, Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002.

V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012

REFERENCES

Deborah E. Bouchoux, “Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets”, Cengage Learning, Third Edition, 2012.

Prabuddha Ganguli,”Intellectual Property Rights: Unleashing the Knowledge Economy”, McGraw Hill Education, 2011.

Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

GE8073 FUNDAMENTALS OF NANOSCIENCE L T P C
3 0 0 3

OBJECTIVE:

To learn about basis of nanomaterial science, preparation method, types and application

UNIT I INTRODUCTION 8

Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II GENERAL METHODS OF PREPARATION 9

Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III NANOMATERIALS 12

Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications- Nanometal oxides-ZnO, TiO2,MgO, ZrO2, NiO, nanoalumina, CaO, AgTiO2, Ferrites, Nanoclays-

functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

UNIT IV CHARACTERIZATION TECHNIQUES 9

X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation.

UNIT V APPLICATIONS 7

NanoInfoTech: Information storage- nanocomputer, molecular switch, super chip, nanocrystal, Nanobiotechlogy: nanoprobes in medical diagnostics and biotechnology, Nano medicines, Targetted drug delivery, Bioimaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nanosensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sunbarrier products - In Photostat, printing, solar cell, battery.

TOTAL : 45 PERIODS

OUTCOMES:

Will familiarize about the science of nanomaterials
Will demonstrate the preparation of nanomaterials
Will develop knowledge in characteristic nanomaterial

TEXT BOOKS :

A.S. Edelstein and R.C. Cammearata, eds., “Nanomaterials: Synthesis, Properties and Applications”, Institute of Physics Publishing, Bristol and Philadelphia, 1996.

N John Dinardo, “Nanoscale Characterization of surfaces & Interfaces”, 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000.

REFERENCES:

G Timp, “Nanotechnology”, AIP press/Springer, 1999.

Akhlesh Lakhtakia, “The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations”. Prentice-Hall of India (P) Ltd, New Delhi, 2007.

ME8071	REFRIGERATION AND AIR CONDITIONING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the underlying principles of operations in different Refrigeration & Air conditioning systems and components.
To provide knowledge on design aspects of Refrigeration & Air conditioning systems

UNIT I INTRODUCTION 9

Introduction to Refrigeration - Unit of Refrigeration and C.O.P.– Ideal cycles- Refrigerants Desirable properties – Classification - Nomenclature - ODP & GWP.

UNIT II VAPOUR COMPRESSION REFRIGERATION SYSTEM 9

Vapor compression cycle : p-h and T-s diagrams - deviations from theoretical cycle – subcooling and super heating- effects of condenser and evaporator pressure on COP- multipressure system - low temperature refrigeration - Cascade systems – problems. Equipments: Type of Compressors, Condensers, Expansion devices, Evaporators.

UNIT III OTHER REFRIGERATION SYSTEMS 9

Working principles of Vapour absorption systems and adsorption cooling systems – Steam jet refrigeration- Ejector refrigeration systems- Thermoelectric refrigeration- Air refrigeration - Magnetic - Vortex and Pulse tube refrigeration systems.

UNIT IV PSYCHROMETRIC PROPERTIES AND PROCESSES 9

Properties of moist Air-Gibbs Dalton law, Specific humidity, Dew point temperature, Degree of saturation, Relative humidity, Enthalpy, Humid specific heat, Wet bulb temperature Thermodynamic wet bulb temperature, Psychrometric chart; Psychrometric of air-conditioning processes, mixing of air streams.

UNIT V AIR CONDITIONING SYSTEMS AND LOAD ESTIMATION 9

Air conditioning loads: Outside and inside design conditions; Heat transfer through structure, Solar radiation, Electrical appliances, Infiltration and ventilation, internal heat load; Apparatus selection; fresh air load, human comfort & IAQ principles, effective temperature & chart, calculation of summer & winter air conditioning load; Classifications, Layout of plants; Air distribution system; Filters; Air Conditioning Systems with Controls: Temperature, Pressure and Humidity sensors, Actuators & Safety controls.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the basic concepts of Refrigeration
CO2 Explain the Vapor compression Refrigeration systems and to solve problems
CO3 Discuss the various types of Refrigeration systems
CO4 Calculate the Psychrometric properties and its use in psychrometric processes
CO5 Explain the concepts of Air conditioning and to solve problems

TEXT BOOK:

1. Arora, C.P., "Refrigeration and Air Conditioning", 3rd edition, McGraw Hill, New Delhi, 2010.

REFERENCES:

1. ASHRAE Hand book, Fundamentals, 2010
2. Jones W.P., "Air conditioning engineering", 5th edition, Elsevier Butterworth-Heinemann, 2007
3. Roy J. Dossat, "Principles of Refrigeration", 4th edition, Pearson Education Asia, 2009.
Stoecker, W.F. and Jones J. W., "Refrigeration and Air Conditioning", McGraw Hill, New Delhi, 1986.

ME8072	RENEWABLE SOURCES OF ENERGY	L	T	P	C
		3	0	0	3

OBJECTIVE:

- At the end of the course, the students are expected to identify the new methodologies / technologies for effective utilization of renewable energy sources.

UNIT I INTRODUCTION **9**

World Energy Use – Reserves of Energy Resources – Environmental Aspects of Energy Utilisation – Renewable Energy Scenario in Tamil nadu, India and around the World – Potentials - Achievements / Applications – Economics of renewable energy systems.

UNIT II SOLAR ENERGY **9**

Solar Radiation – Measurements of Solar Radiation - Flat Plate and Concentrating Collectors – Solar direct Thermal Applications – Solar thermal Power Generation - Fundamentals of Solar Photo Voltaic Conversion – Solar Cells – Solar PV Power Generation – Solar PV Applications.

UNIT III WIND ENERGY **9**

Wind Data and Energy Estimation – Types of Wind Energy Systems – Performance – Site Selection – Details of Wind Turbine Generator – Safety and Environmental Aspects

UNIT IV BIO - ENERGY **9**

Biomass direct combustion – Biomass gasifiers – Biogas plants – Digesters – Ethanol production – Bio diesel – Cogeneration - Biomass Applications

UNIT V OTHER RENEWABLE ENERGY SOURCES **9**

Tidal energy – Wave Energy – Open and Closed OTEC Cycles – Small Hydro-Geothermal Energy – Hydrogen and Storage - Fuel Cell Systems – Hybrid Systems.

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Discuss the importance and Economics of renewable Energy
CO2 Discuss the method of power generation from Solar Energy
CO3 Discuss the method of power generation from Wind Energy
CO4 Explain the method of power generation from Bio Energy
CO5 Explain the Tidal energy, Wave Energy, OTEC, Hydro energy, Geothermal Energy, Fuel Cells and Hybrid Systems.

TEXT BOOKS:

Rai. G.D., "Non Conventional Energy Sources", Khanna Publishers, New Delhi, 2011.
Twidell, J.W. & Weir, A., "Renewable Energy Sources", EFN Spon Ltd., UK, 2006.

REFERENCES:

Chetan Singh Solanki, Solar Photovoltaics, "Fundamentals, Technologies and Applications", PHI Learning Private Limited, New Delhi, 2015.

David M. Mousdale – "Introduction to Biofuels", CRC Press, Taylor & Francis Group, USA 2017

Freris. L.L., "Wind Energy Conversion Systems", Prentice Hall, UK, 1990.

Godfrey Boyle, "Renewable Energy, Power for a Sustainable Future", Oxford University Press, U.K., 2012.

Johnson Gary, L. "Wind Energy Systems", Prentice Hall, New York, 1985

ME8098	QUALITY CONTROL AND RELIABILITY ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To introduce the concept of SQC

To understand process control and acceptance sampling procedure and their application.

To learn the concept of reliability.

UNIT I INTRODUCTION AND PROCESS CONTROL FOR VARIABLES 9

Introduction, definition of quality, basic concept of quality, definition of SQC, benefits and limitation of SQC, Quality assurance, Quality control: Quality cost-Variation in process causes of variation – Theory of control chart- uses of control chart –X chart, R chart and chart - process capability – process capability studies and simple problems. Six sigma concepts

UNIT II PROCESS CONTROL FOR ATTRIBUTES 9

Control chart for attributes –control chart for non conformings– p chart and np chart – control chart for nonconformities– C and U charts, State of control and process out of control identification in charts, pattern study.

UNIT III ACCEPTANCE SAMPLING 9

Lot by lot sampling – types – probability of acceptance in single, double, multiple sampling techniques – O.C. curves – producer,s Risk and consumer,s Risk. AQL, LTPD, AOQL concepts-standard sampling plans for AQL and LTPD- uses of standard sampling plans.

UNIT IV LIFE TESTING – RELIABILITY 9

Life testing – Objective – failure data analysis, Mean failure rate, mean time to failure, mean time between failure, hazard rate – Weibull model, system reliability, series, parallel and mixed configuration – simple problems. Maintainability and availability – simple problems. Acceptance sampling based on reliability test – O.C Curves.

UNIT V QUALITY AND RELIABILITY 9

Reliability improvements – techniques- use of Pareto analysis – design for reliability – redundancy unit and standby redundancy – Optimization in reliability – Product design – Product analysis – Product development–Product life cycles.

Note: Use of approved statistical table permitted in the examination.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Summarize the concept of Quality and Process control for variables

CO2 Apply the process control for attributes

CO3 Explain the concept of sampling and to solve problems

CO4 Explain the concept of Life testing

CO5 Explain the concept Reliability and techniques involved

TEXT BOOKS:

1. Douglas.C. Montgomery, “Introduction to Statistical quality control”, 7th edition, John Wiley 2012.

2. Srinath. L.S., “Reliability Engineering”, Affiliated East west press, 2008.

REFERENCES:

Besterfield D.H., “Quality Control”, Prentice Hall, 2013.
Connor, P.D.T.O., “Practical Reliability Engineering”, John Wiley, 2012
Danny Samson, “Manufacturing & Operations Strategy”, Prentice Hall, 1991
Grant, Eugene .L “Statistical Quality Control”, McGraw-Hill, 2017
Gupta. R.C, “Statistical Quality control”, Khanna Publishers, 2001.

ME8073 UNCONVENTIONAL MACHINING PROCESSES LTPC 3003

OBJECTIVE:

To learn about various unconventional machining processes, the various process parameters and their influence on performance and their applications

UNIT I INTRODUCTION AND MECHANICAL ENERGY BASED PROCESSES 9

Unconventional machining Process **–** Need **–** classification **–** merits, demerits and applications. Abrasive Jet Machining **–** Water Jet Machining **–** Abrasive Water Jet Machining - Ultrasonic Machining. (AJM, WJM, AWJM and USM). Working Principles **–** equipment used **–** Process parameters **–** MRR- Applications.

UNIT II THERMAL AND ELECTRICAL ENERGY BASED PROCESSES 9

Electric Discharge Machining (EDM) **–** Wire cut EDM **–** Working Principle-equipments-Process Parameters-Surface Finish and MRR- electrode / Tool **–** Power and control Circuits-Tool Wear **–** Dielectric **–** Flushing **—** Applications. Laser Beam machining and drilling, (LBM), plasma, Arc machining (PAM) and Electron Beam Machining (EBM). Principles **–** Equipment **–**Types - Beam control techniques **–** Applications.

UNIT III CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES 9

Chemical machining and Electro-Chemical machining (CHM and ECM)- Etchants **–** Maskant - techniques of applying maskants - Process Parameters **–** Surface finish and MRR-Applications. Principles of ECM- equipments-Surface Roughness and MRR Electrical circuit-Process Parameters-ECG and ECH - Applications.

UNIT IV ADVANCED NANO FINISHING PROCESSES 9

Abrasive flow machining, chemo-mechanical polishing, magnetic abrasive finishing, magneto rheological finishing, magneto rheological abrasive flow finishing their working principles, equipments, effect of process parameters, applications, advantages and limitations.

UNIT V RECENT TRENDS IN NON-TRADITIONAL MACHINING PROCESSES 9

Recent developments in non-traditional machining processes, their working principles, equipments, effect of process parameters, applications, advantages and limitations. Comparison of non-traditional machining processes.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the need for unconventional machining processes and its classification
CO2 Compare various thermal energy and electrical energy based unconventional machining processes.
CO3 Summarize various chemical and electro-chemical energy based unconventional machining processes.
CO4 Explain various nano abrasives based unconventional machining processes.
CO5 Distinguish various recent trends based unconventional machining processes.

TEXT BOOKS:

Vijay.K. Jain “Advanced Machining Processes” Allied Publishers Pvt. Ltd., New Delhi, 2007
Pandey P.C. and Shan H.S. “Modern Machining Processes” Tata McGraw-Hill, New Delhi, 2007.

REFERENCES:

Benedict. G.F. “Nontraditional Manufacturing Processes”, Marcel Dekker Inc., New York, 1987.
Mc Geough, “Advanced Methods of Machining”, Chapman and Hall, London, 1998.
Paul De Garmo, J.T.Black, and Ronald. A.Kohser, “Material and Processes in Manufacturing” Prentice Hall of India Pvt. Ltd., 8thEdition, New Delhi , 2001.

MG8491	OPERATIONS RESEARCH	L	T	P	C
		3	0	0	3

OBJECTIVE:

To provide knowledge and training in using optimization techniques under limited resources for the engineering and business problems.

UNIT I LINEAR MODELS 15

The phase of an operation research study – Linear programming – Graphical method– Simplex algorithm – Duality formulation – Sensitivity analysis.

UNIT II TRANSPORTATION MODELS AND NETWORK MODELS 8

Transportation Assignment Models –Traveling Salesman problem-Networks models – Shortest route – Minimal spanning tree – Maximum flow models –Project network – CPM and PERT networks – Critical path scheduling – Sequencing models.

UNIT III INVENTORY MODELS 6

Inventory models – Economic order quantity models – Quantity discount models – Stochastic inventory models – Multi product models – Inventory control models in practice.

UNIT IV QUEUEING MODELS 6

Queueing models - Queueing systems and structures – Notation parameter – Single server and multi server models – Poisson input – Exponential service – Constant rate service – Infinite population – Simulation.

UNIT V DECISION MODELS 10

Decision models – Game theory – Two person zero sum games – Graphical solution- Algebraic solution– Linear Programming solution – Replacement models – Models based on service life – Economic life– Single / Multi variable search technique – Dynamic Programming – Simple Problem.

TOTAL: 45 PERIODS

OUTCOME:

Upon completion of this course, the students can able to use the optimization techniques for use engineering and Business problems

TEXT BOOK:

Hillier and Libeberman, “Operations Research”, Holden Day, 2005
Taha H.A., “Operations Research”, Sixth Edition, Prentice Hall of India, 2003.

REFERENCES:

Bazara M.J., Jarvis and Sherali H., “Linear Programming and Network Flows”, John Wiley, 2009.

Budnick F.S., “Principles of Operations Research for Management”, Richard D Irwin, 1990.
Philip D.T. and Ravindran A., “Operations Research”, John Wiley, 1992.

Shennoy G.V. and Srivastava U.K., “Operation Research for Management”, Wiley Eastern, 1994.

Tulsian and Pasdey V., “Quantitative Techniques”, Pearson Asia, 2002.

MF8071 ADDITIVE MANUFACTURING LTPC
3 0 0 3

OBJECTIVES:

To know the principle, methods, possibilities and limitations as well as environmental effects of Additive Manufacturing technologies.

To be familiar with the characteristics of the different materials those are used in Additive Manufacturing technologies.

UNIT I INTRODUCTION 9

Overview **–** Need - Development of Additive Manufacturing Technology -Principle **–** AM Process Chain- Classification **–**Rapid Prototyping- Rapid Tooling **–** Rapid Manufacturing **–** Applications-Benefits **–**Case studies.

UNIT II DESIGN FOR ADDITIVE MANUFACTURING 9

Design tools: Data processing - CAD model preparation **–** Part orientation and support structure generation **–** Model slicing **–**Tool path generation- Design for Additive Manufacturing: Concepts and objectives- AM unique capabilities **–** DFAM for part quality improvement- Customised design and fabrication for medical applications.

UNIT III PHOTOPOLYMERIZATION AND POWDER BED FUSION PROCESSES 9

Photo polymerization: SLA-Photo curable materials **–** Process - Advantages and Applications. Powder Bed Fusion: SLS-Process description **–** powder fusion mechanism **–** Process Parameters **–** Typical Materials and Application. Electron Beam Melting.

UNIT IV EXTRUSION BASED AND SHEET LAMINATION PROCESSES 9 Extrusion Based System: FDM-Introduction **–** Basic Principle **–** Materials **–** Applications and Limitations **–** Bioextrusion. Sheet Lamination Process:LOM- Gluing or Adhesive bonding **–** Thermal bonding.

UNIT V PRINTING PROCESSES AND BEAM DEPOSITION PROCESSES 9

Droplet formation technologies **–** Continuous mode **–** Drop on Demand mode **–** Three Dimensional Printing **–** Advantages **–** Bioplotter - Beam Deposition Process:LENS- Process description **–** Material delivery **–** Process parameters **–** Materials **–** Benefits **–** Applications.

TOTAL: 45 PERIODS

OUTCOME:

On completion of this course, students will learn about a working principle and construction of Additive Manufacturing technologies, their potential to support design and manufacturing, modern development in additive manufacturing process and case studies relevant to mass customized manufacturing.

TEXT BOOKS:

Chua C.K., Leong K.F., and Lim C.S., **"**Rapid prototyping: Principles and applications**"**, Third edition, World Scientific Publishers, 2010.

Ian Gibson, David W.Rosen, Brent Stucker **"**Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing**"** Springer , 2010.

REFERENCES:

1 Andreas Gebhardt **"**Understanding Additive Manufacturing: Rapid Prototyping, Rapid Manufacturing**"** Hanser Gardner Publication 2011.

Kamrani A.K. and Nasr E.A., **"**Rapid Prototyping: Theory and practice**"**, Springer, 2006.

Liou L.W. and Liou F.W., **"**Rapid Prototyping and Engineering applications :A tool box for prototype development**"**, CRC Press, 2007.

Tom Page **"**Design for Additive Manufacturing**"** LAP Lambert Academic Publishing, 2012.

GE8077 TOTAL QUALITY MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:

To facilitate the understanding of Quality Management principles and process.

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.

UNIT II TQM PRINCIPLES 9

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I 9

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II 9

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM 9

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation—Documentation—Internal Audits—Registration--**ENVIRONMENTAL MANAGEMENT SYSTEM:**

Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001—Benefits of EMS.

TOTAL: 45 PERIODS

OUTCOME:

The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXT BOOK:

Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, “Total Quality Management”, Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
ISO 9001-2015 standards

ME8099	ROBOTICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the functions of the basic components of a Robot.
To study the use of various types of End of Effectors and Sensors
To impart knowledge in Robot Kinematics and Programming
To learn Robot safety issues and economics.

UNIT I FUNDAMENTALS OF ROBOT **9**

Robot - Definition - Robot Anatomy - Co ordinate Systems, Work Envelope Types and Classification- Specifications-Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load- Robot Parts and their Functions-Need for Robots-Different Applications.

UNIT II ROBOT DRIVE SYSTEMS AND END EFFECTORS **9**

Pneumatic Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives-D.C. Servo Motors, Stepper Motors, A.C. Servo Motors-Salient Features, Applications and Comparison of all these Drives, End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic- Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT III SENSORS AND MACHINE VISION **9**

Requirements of a sensor, Principles and Applications of the following types of sensors- Position sensors - Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, pneumatic Position Sensors, Range Sensors Triangulations Principles, Structured, Lighting Approach, Time of Flight, Range Finders, Laser Range Meters, Touch Sensors ,binary Sensors., Analog Sensors, Wrist Sensors, Compliance Sensors, Slip Sensors, Camera, Frame Grabber, Sensing and Digitizing Image Data-Signal Conversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms, Applications-Inspection, Identification, Visual Serving and Navigation.

UNIT IV ROBOT KINEMATICS AND ROBOT PROGRAMMING 9

Forward Kinematics, Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Four Degrees of freedom (in 3 Dimension) Jacobians, Velocity and Forces-Manipulator Dynamics, Trajectory Generator, Manipulator Mechanism Design-Derivations and problems. Lead through Programming, Robot programming Languages-VAL Programming-Motion Commands, Sensor Commands, End Effector commands and simple Programs.

UNIT V IMPLEMENTATION AND ROBOT ECONOMICS 9

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the concepts of industrial robots, classification, specifications and coordinate systems. Also summarize the need and application of robots in different sectors.

CO2 Illustrate the different types of robot drive systems as well as robot end effectors.

CO3 Apply the different sensors and image processing techniques in robotics to improve the ability of robots.

CO4 Develop robotic programs for different tasks and familiarize with the kinematics motions of robot.

CO5 Examine the implementation of robots in various industrial sectors and interpolate the economic analysis of robots.

TEXT BOOKS:

Groover M.P., “Industrial Robotics -Technology Programming and Applications”, McGraw Hill, 2012.

Klafter R.D., Chmielewski T.A and Negin M., “Robotic Engineering - An Integrated Approach”,Prentice Hall, 2003.

REFERENCES:

Craig J.J., “Introduction to Robotics Mechanics and Control”, Pearson Education, 2008.

Deb S.R., “Robotics Technology and Flexible Automation” Tata McGraw Hill Book Co., 2013.

Fu.K.S.,Gonzalz R.C. and Lee C.S.G., “Robotics Control, Sensing, Vision and Intelligence”, McGraw Hill Book Co., 1987.

Janakiraman P.A., “Robotics and Image Processing”, Tata McGraw Hill, 1995.

Koren Y., “Robotics for Engineers", Mc Graw Hill Book Co., 1992.

ME8095	DESIGN OF JIGS, FIXTURES AND PRESS TOOLS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the functions and design principles of Jigs, fixtures and press tools

To gain proficiency in the development of required views of the final design.

UNIT I LOCATING AND CLAMPING PRINCIPLES: 9

Objectives of tool design- Function and advantages of Jigs and fixtures – Basic elements – principles of location – Locating methods and devices – Redundant Location – Principles of clamping – Mechanical actuation – pneumatic and hydraulic actuation Standard parts – Drill bushes and Jig buttons – Tolerances and materials used.

UNIT II JIGS AND FIXTURES 9

Design and development of jigs and fixtures for given component- Types of Jigs – Post, Turnover, Channel, latch, box, pot, angular post jigs – Indexing jigs – General principles of milling, Lathe, boring, broaching and grinding fixtures – Assembly, Inspection and Welding fixtures – Modular fixturing systems- Quick change fixtures.

UNIT III PRESS WORKING TERMINOLOGIES AND ELEMENTS OF CUTTING DIES 9

Press Working Terminologies - operations – Types of presses – press accessories – Computation of press capacity – Strip layout – Material Utilization – Shearing action – Clearances – Press Work Materials – Center of pressure- Design of various elements of dies – Die Block – Punch holder, Die set, guide plates – Stops – Strippers – Pilots – Selection of Standard parts – Design and preparation of four standard views of simple blanking, piercing, compound and progressive dies.

UNIT IV BENDING AND DRAWING DIES 9

Difference between bending and drawing – Blank development for above operations – Types of Bending dies – Press capacity – Spring back – knockouts – direct and indirect – pressure pads – Ejectors – Variables affecting Metal flow in drawing operations – draw die inserts – draw beads- ironing – Design and development of bending, forming, drawing, reverse redrawing and combination dies – Blank development for axisymmetric, rectangular and elliptic parts – Single and double action dies.

UNIT V FORMING TECHNIQUES AND EVALUATION 9

Bulging, Swaging, Embossing, coining, curling, hole flanging, shaving and sizing, assembly, fine Blanking dies – recent trends in tool design- computer Aids for sheet metal forming Analysis – basic introduction - tooling for numerically controlled machines- setup reduction for work holding – Single minute exchange of dies – Poka Yoke.

TOTAL: 45 PERIODS

Note: (Use of P S G Design Data Book is permitted in the University examination)

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Summarize the different methods of Locating Jigs and Fixtures and Clamping principles
CO2 Design and develop jigs and fixtures for given component
CO3 Discuss the press working terminologies and elements of cutting dies
CO4 Distinguish between Bending and Drawing dies.
CO5 Discuss the different types of forming techniques

TEXT BOOKS:

Joshi, P.H. “Jigs and Fixtures”, Second Edition, Tata McGraw Hill Publishing Co., Ltd., New Delhi, 2010.
Joshi P.H “Press tools - Design and Construction”, wheels publishing, 1996

REFERENCES:

ASTME Fundamentals of Tool Design Prentice Hall of India.
Design Data Hand Book, PSG College of Technology, Coimbatore.
Donaldson, Lecain and Goold “Tool Design”, 5th Edition, Tata McGraw Hill, 2017.
Hoffman “Jigs and Fixture Design”, Thomson Delmar Learning, Singapore, 2004.
Kempster, “Jigs and Fixture Design”, Third Edition, Hoddes and Stoughton, 1974.
Venkataraman. K., “Design of Jigs Fixtures & Press Tools”, Tata McGraw Hill, New Delhi, 2005.

ME8093	COMPUTATIONAL FLUID DYNAMICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To introduce Governing Equations of viscous fluid flows

To introduce numerical modeling and its role in the field of fluid flow and heat transfer

To enable the students to understand the various discretization methods, solution procedures and turbulence modeling.

To create confidence to solve complex problems in the field of fluid flow and heat transfer by using high speed computers.

UNIT I GOVERNING EQUATIONS AND BOUNDARY CONDITIONS 9

Basics of computational fluid dynamics – Governing equations of fluid dynamics – Continuity, Momentum and Energy equations – Chemical species transport – Physical boundary conditions – Time-averaged equations for Turbulent Flow – Turbulent–Kinetic Energy Equations – Mathematical behaviour of PDEs on CFD - Elliptic, Parabolic and Hyperbolic equations.

UNIT II FINITE DIFFERENCE AND FINITE VOLUME METHODS FOR DIFFUSION 9

Derivation of finite difference equations – Simple Methods – General Methods for first and second order accuracy – Finite volume formulation for steady state One, Two and Three - dimensional diffusion problems –Parabolic equations – Explicit and Implicit schemes – Example problems on elliptic and parabolic equations – Use of Finite Difference and Finite Volume methods.

UNIT III FINITE VOLUME METHOD FOR CONVECTION DIFFUSION 9

Steady one-dimensional convection and diffusion – Central, upwind differencing schemes properties of discretization schemes – Conservativeness, Boundedness, Transportiveness, Hybrid, Power-law, QUICK Schemes.

UNIT IV FLOW FIELD ANALYSIS 9 Finite volume methods -Representation of the pressure gradient term and continuity equation

– Staggered grid – Momentum equations – Pressure and Velocity corrections – Pressure Correction equation, SIMPLE algorithm and its variants – PISO Algorithms.

UNIT V TURBULENCE MODELS AND MESH GENERATION 9 Turbulence models, mixing length model, Two equation (k-Є) models – High and low

Reynolds number models – Structured Grid generation – Unstructured Grid generation – Mesh refinement – Adaptive mesh – Software tools.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Derive the governing equations and boundary conditions for Fluid dynamics

CO2 Analyze Finite difference and Finite volume methods for Diffusion

CO3 Analyze Finite volume method for Convective diffusion

CO4 Analyze Flow field problems

CO5 Explain and solve the Turbulence models and Mesh generation techniques

TEXT BOOKS:

Ghoshdastidar, P.S., "Computer Simulation of flow and heat transfer", Tata McGraw Hill Publishing Company Ltd., 2017.

Versteeg, H.K., and Malalasekera, W., "An Introduction to Computational Fluid Dynamics: The finite volume Method", Pearson Education Ltd.Second Edition, 2007.

REFERENCES:

Anil W. Date "Introduction to Computational Fluid Dynamics" Cambridge University Press, 2005.

Chung, T.J. "Computational Fluid Dynamics", Cambridge University, Press, 2002.

Ghoshdastidar P.S., "Heat Transfer", Oxford University Press, 2005

Muralidhar, K., and Sundararajan, T., "Computational Fluid Flow and Heat Transfer", Narosa Publishing House, New Delhi, 2014.

Patankar, S.V. "Numerical Heat Transfer and Fluid Flow", Hemisphere Publishing Corporation, 2004

ME8097	NON DESTRUCTIVE TESTING AND EVALUATION	L	T	P	C
		3	0	0	3

OBJECTIVE:

To study and understand the various Non Destructive Evaluation and Testing methods, theory and their industrial applications.

UNIT I OVERVIEW OF NDT **9**

NDT Versus Mechanical testing, Overview of the Non Destructive Testing Methods for the detection of manufacturing defects as well as material characterisation. Relative merits and limitations, Various physical characteristics of materials and their applications in NDT., Visual inspection – Unaided and aided.

UNIT II SURFACE NDE METHODS 9 Liquid Penetrant Testing - Principles, types and properties of liquid penetrants,

developers, advantages and limitations of various methods, Testing Procedure, Interpretation of results. Magnetic Particle Testing- Theory of magnetism, inspection materials Magnetisation methods, Interpretation and evaluation of test indications, Principles and methods of demagnetization, Residual magnetism.

UNIT III THERMOGRAPHY AND EDDY CURRENT TESTING (ET) **9**

Thermography- Principles, Contact and non contact inspection methods, Techniques for applying liquid crystals, Advantages and limitation - infrared radiation and infrared detectors, Instrumentations and methods, applications. Eddy Current Testing-Generation of eddy currents, Properties of eddy currents, Eddy current sensing elements, Probes, Instrumentation, Types of arrangement, Applications, advantages, Limitations, Interpretation/Evaluation.

UNIT IV ULTRASONIC TESTING (UT) AND ACOUSTIC EMISSION (AE) **9**

Ultrasonic Testing-Principle, Transducers, transmission and pulse-echo method, straight beam and angle beam, instrumentation, data representation, A/Scan, B-scan, C-scan. Phased Array Ultrasound, Time of Flight Diffraction. Acoustic Emission Technique – Principle, AE parameters, Applications

UNIT V RADIOGRAPHY (RT) **9**

Principle, interaction of X-Ray with matter, imaging, film and film less techniques, types and use of filters and screens, geometric factors, Inverse square, law, characteristics of films - graininess, density, speed, contrast, characteristic curves, Penetrameters, Exposure charts, Radiographic equivalence. Fluoroscopy- Xero-Radiography, Computed Radiography, Computed Tomography

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the fundamental concepts of NDT
CO2 Discuss the different methods of NDE
CO3 Explain the concept of Thermography and Eddy current testing
CO4 Explain the concept of Ultrasonic Testing and Acoustic Emission
CO5 Explain the concept of Radiography

TEXT BOOKS:

Baldev Raj, T.Jayakumar, M.Thavasimuthu "Practical Non-Destructive Testing", Narosa Publishing House, 2014.

Ravi Prakash, "Non-Destructive Testing Techniques", 1st revised edition, New Age International Publishers, 2010

ASM Metals Handbook, "Non-Destructive Evaluation and Quality Control", American Society of Metals, Metals Park, Ohio, USA, 200, Volume-17.

ASNT, American Society for Non Destructive Testing, Columbus, Ohio, NDT Handbook,Vol. 1, Leak Testing, Vol. 2, Liquid Penetrant Testing, Vol. 3, Infrared and Thermal Testing Vol. 4, Radiographic Testing, Vol. 5, Electromagnetic Testing, Vol. 6, Acoustic Emission Testing, Vol. 7, Ultrasonic Testing

Charles, J. Hellier," Handbook of Nondestructive evaluation", McGraw Hill, New York 2001.

Paul E Mix, "Introduction to Non-destructive testing: a training guide", Wiley, 2nd Edition New Jersey, 2005

ME8092	COMPOSITE MATERIALS AND MECHANICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the fundamentals of composite material strength and its mechanical behavior

Understanding the analysis of fiber reinforced Laminate design for different combinations of plies with different orientations of the fiber.

Thermo-mechanical behavior and study of residual stresses in Laminates during processing.

Implementation of Classical Laminate Theory (CLT) to study and analysis for residual stresses in an isotropic layered structure such as electronic chips.

UNIT I INTRODUCTION, LAMINA CONSTITUTIVE EQUATIONS & MANUFACTURING 9

Definition –Need – General Characteristics, Applications. Fibers – Glass, Carbon, Ceramic and Aramid fibers. Matrices – Polymer, Graphite, Ceramic and Metal Matrices – Characteristics of fibers and matrices. Lamina Constitutive Equations: Lamina Assumptions – Macroscopic Viewpoint. Generalized Hooke,s Law. Reduction to Homogeneous Orthotropic Lamina – Isotropic limit case, Orthotropic Stiffness matrix (Qij), Typical Commercial material properties, Rule of Mixtures. Generally Orthotropic Lamina –Transformation Matrix, Transformed Stiffness. Manufacturing: Bag Moulding Compression Moulding – Pultrusion – Filament Winding – Other Manufacturing Processes

UNIT II FLAT PLATE LAMINATE CONSTITUTE EQUATIONS 9

Definition of stress and Moment Resultants. Strain Displacement relations. Basic Assumptions of Laminated anisotropic plates. Laminate Constitutive Equations – Coupling Interactions, Balanced Laminates, Symmetric Laminates, Angle Ply Laminates, Cross Ply Laminates. Laminate Structural Moduli. Evaluation of Lamina Properties from Laminate Tests. Quasi-Isotropic Laminates. Determination of Lamina stresses within Laminates.

UNIT III LAMINA STRENGTH ANALYSIS 9

Introduction - Maximum Stress and Strain Criteria. Von-Misses Yield criterion for Isotropic Materials. Generalized Hill,s Criterion for Anisotropic materials. Tsai-Hill,s Failure Criterion for Composites. Tensor Polynomial (Tsai-Wu) Failure criterion. Prediction of laminate Failure

UNIT IV THERMAL ANALYSIS 9

Assumption of Constant C.T.E,s. Modification of Hooke,s Law. Modification of Laminate Constitutive Equations. Orthotropic Lamina C.T.E,s. C.T.E,s for special Laminate Configurations – Unidirectional, Off-axis, Symmetric Balanced Laminates, Zero C.T.E laminates, Thermally Quasi-Isotropic Laminates

UNIT V ANALYSIS OF LAMINATED FLAT PLATES 9

Equilibrium Equations of Motion. Energy Formulations. Static Bending Analysis. Buckling Analysis. Free Vibrations – Natural Frequencies

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Summarize the various types of Fibers, Equations and manufacturing methods for Composite materials
CO2 Derive Flat plate Laminate equations
CO3 Analyze Lamina strength
CO4 Analyze the thermal behavior of Composite laminates
CO5 Analyze Laminate flat plates

TEXT BOOKS:

Gibson, R.F., "Principles of Composite Material Mechanics", Second Edition, McGraw-Hill, CRC press in progress, 1994, -.
Hyer, M.W., “Stress Analysis of Fiber – Reinforced Composite Materials”, McGraw Hill, 1998

REFERENCES:

Agarwal, B.D., and Broutman L.J., “Analysis and Performance of Fiber Composites”, John Wiley and Sons, New York, 1990.
Halpin, J.C., “Primer on Composite Materials, Analysis”, Technomic Publishing Co., 1984.
Issac M. Daniel and Ori Ishai, “Engineering Mechanics of Composite Materials”, Oxford University Press-2006, First Indian Edition - 2007
Mallick, P.K., Fiber, ”Reinforced Composites: Materials, Manufacturing and Design”, Maneel Dekker Inc, 1993.
Mallick, P.K. and Newman, S., (edition), “Composite Materials Technology: Processes and Properties”, Hansen Publisher, Munish, 1990.

GE8072	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the global trends and development methodologies of various types of products and services

To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems

To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification

To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics

To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends - Environmental Trends - Political/Policy Trends **- Introduction to Product Development Methodologies and Management -** Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies Product Life Cycle – Product Development Planning and Management.

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9

Requirement Engineering - Types of Requirements - Requirement Engineering - traceability Matrix and Analysis - Requirement Management - **System Design & Modeling -** Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design.

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – **Challenges in Integration of Engineering Disciplines** - Concept Screening & Evaluation - **Detailed Design -** Component Design and Verification – **Mechanical, Electronics and Software Subsystems** - High Level Design/Low Level Design of S/W Program **-** Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – **Prototyping -** Introduction to Rapid Prototyping and Rapid Manufacturing - **System Integration, Testing, Certification and Documentation**

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product Validation processes and stages - Product Testing Standards and Certification - Product Documentation **Sustenance -**Maintenance and Repair – Enhancements - **Product EoL -** Obsolescence Management – Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product Development in Industry versus Academia –**The IPD Essentials -** Introduction to Vertical Specific Product Development processes -Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and Software Systems – Product Development Trade-offs - Intellectual Property Rights and Confidentiality – Security and Configuration Management.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Define, formulate and analyze a problem

Solve specific problems independently or as part of a team

Gain knowledge of the Innovation & Product Development process in the Business Context

Work independently as well as in teams

Manage a project from start to finish

TEXTBOOKS:

Book specially prepared by NASSCOM as per the MoU.

Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, Fifth Edition, 2011.

John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill, Eleventh Edition, 2005.

REFERENCES:

Hiriyappa B, “Corporate Strategy – Managing the Business”, Author House, 2013.

Peter F Drucker, “People and Performance”, Butterworth – Heinemann [Elsevier], Oxford, 2004.

Vinod Kumar Garg and Venkita Krishnan N K, “Enterprise Resource Planning – Concepts”, Second Edition, Prentice Hall, 2003.

Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, Seventh Edition, 2013

GE8074	**HUMAN RIGHTS**	**L T P C**
		3 0 0 3

OBJECTIVE:

To sensitize the Engineering students to various aspects of Human Rights.

UNIT I **9**

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II **9**

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III **9**

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV **9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO,s, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

OUTCOME :

Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

Chandra U., “Human Rights”, Allahabad Law Agency, Allahabad, 2014.

Kapoor S.K., “Human Rights under International law and Indian Laws”, Central Law Agency, Allahabad, 2014.

Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

GE8071 DISASTER MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

To provide students an exposure to disasters, their significance and types.

To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction

To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)

To enhance awareness of institutional processes in the country and

To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don,ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions / Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional

Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9 Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

Differentiate the types of disasters, causes and their impact on environment and society

Assess vulnerability and various methods of risk reduction measures as well as mitigation.

Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

TEXT BOOKS:

Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011

Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423

Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]

REFERENCES

Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005

Government of India, National Disaster Management Policy,2009.

IE8693	PRODUCTION PLANNING AND CONTROL	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the various components and functions of production planning and control such as work study, product planning, process planning, production scheduling, Inventory Control.

To know the recent trends like manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP).

UNIT I INTRODUCTION 9

Objectives and benefits of planning and control-Functions of production control-Types of production-job- batch and continuous-Product development and design-Marketing aspect - Functional aspects-Operational aspect-Durability and dependability aspect aesthetic aspect. Profit consideration-Standardization, Simplification & specialization- Break even analysis-Economics of a new design.

UNIT II WORK STUDY 9

Method study, basic procedure-Selection-Recording of process - Critical analysis, Development - Implementation - Micro motion and memo motion study – work measurement - Techniques of work measurement - Time study - Production study - Work sampling - Synthesis from standard data - Predetermined motion time standards.

UNIT III PRODUCT PLANNING AND PROCESS PLANNING 9 Product planning-Extending the original product information-Value analysis-Problems in lack of

product planning-Process planning and routing-Pre requisite information needed for process planning- Steps in process planning-Quantity determination in batch production-Machine capacity, balancing- Analysis of process capabilities in a multi product system.

UNIT IV PRODUCTION SCHEDULING 9

Production Control Systems-Loading and scheduling-Master Scheduling-Scheduling rules-Gantt charts-Perpetual loading-Basic scheduling problems - Line of balance – Flow production scheduling-Batch production scheduling-Product sequencing – Production Control systems-

Periodic batch control-Material requirement planning kanban – Dispatching-Progress reporting and expediting- Manufacturing lead time-Techniques for aligning completion times and due dates.

UNIT V INVENTORY CONTROL AND RECENT TRENDS IN PPC 9

Inventory control-Purpose of holding stock-Effect of demand on inventories-Ordering procedures. Two bin system - Ordering cycle system-Determination of Economic order quantity and economic lot size- ABC analysis - Recorder procedure-Introduction to computer integrated production planning systems- elements of JUST IN TIME SYSTEMS-Fundamentals of MRP II and ERP.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the students can able to prepare production planning and control activities such as work study, product planning, production scheduling, Inventory Control.

They can plan manufacturing requirements manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP).

TEXT BOOKS:

James. B. Dilworth, ”Operations management – Design, Planning and Control for manufacturing and services” Mcgraw Hill International edition 1992.

Martand Telsang, “Industrial Engineering and Production Management”, First edition, S. Chand and Company, 2000.

REFERENCES:

Chary. S.N., “Theory and Problems in Production & Operations Management”, Tata McGraw Hill, 1995.

Elwood S.Buffa, and Rakesh K.Sarin, “Modern Production / Operations Management”, 8th Edition John Wiley and Sons, 2000.

Jain. K.C. & Aggarwal. L.N., “Production Planning Control and Industrial Management”, Khanna Publishers, 1990.

Kanishka Bedi, “Production and Operations management”, 2nd Edition, Oxford university press, 2007.

Melynk, Denzler, “ Operations management – A value driven approach” Irwin Mcgraw hill.

Norman Gaither, G. Frazier, “Operations Management” 9th Edition, Thomson learning IE, 2007

Samson Eilon, “Elements of Production Planning and Control”, Universal Book Corpn.1984

Upendra Kachru, “ Production and Operations Management – Text and cases” 1st Edition, Excel books 2007

MG8091	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVE:

To develop and strengthen entrepreneurial quality and motivation in students and to impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.

UNIT I ENTREPRENEURSHIP 9

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.

UNIT II MOTIVATION 9

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.

UNIT III BUSINESS 9

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

UNIT IV FINANCING AND ACCOUNTING 9

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.

UNIT V SUPPORT TO ENTREPRENEURS 9

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures - Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

TOTAL : 45 PERIODS

OUTCOME:

Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully.

TEXT BOOKS :

1. Donald F Kuratko, “Entrepreneurship – Theory, Process and Practice”, 9th Edition, Cengage Learning, 2014.
2. Khanka. S.S., “Entrepreneurial Development” S.Chand & Co. Ltd., Ram Nagar, New Delhi, 2013.

REFERENCES :

1. EDII “Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development”, Institute of India, Ahmadabad, 1986.
2. Hisrich R D, Peters M P, “Entrepreneurship” 8th Edition, Tata McGraw-Hill, 2013.

Mathew J Manimala, "Enterprenuership theory at cross roads: paradigms and praxis” 2nd Edition Dream tech, 2005.

Rajeev Roy, "Entrepreneurship" 2nd Edition, Oxford University Press, 2011.

ME8094 COMPUTER INTEGRATED MANUFACTURING SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVE:

To understand the application of computers in various aspects of Manufacturing viz., Design, Proper planning, Manufacturing cost, Layout & Material Handling system.

UNIT I INTRODUCTION 9

Brief introduction to CAD and CAM – Manufacturing Planning, Manufacturing control- Introduction to CAD/CAM – Concurrent Engineering-CIM concepts – Computerised elements of CIM system – Types of production - Manufacturing models and Metrics – Mathematical models of Production Performance – Simple problems – Manufacturing Control – Simple Problems – Basic Elements of an Automated system – Levels of Automation – Lean Production and Just-In-Time Production.

UNIT II PRODUCTION PLANNING AND CONTROL AND COMPUTERISED PROCESS PLANNING 9

Process planning – Computer Aided Process Planning (CAPP) – Logical steps in Computer Aided Process Planning – Aggregate Production Planning and the Master Production Schedule – Material Requirement planning – Capacity Planning- Control Systems-Shop Floor Control-Inventory Control – Brief on Manufacturing Resource Planning-II (MRP-II) & Enterprise Resource Planning (ERP) - Simple Problems.

UNIT III CELLULAR MANUFACTURING 9

Group Technology(GT), Part Families – Parts Classification and coding – Simple Problems in Opitz Part Coding system – Production flow Analysis – Cellular Manufacturing – Composite part concept – Machine cell design and layout – Quantitative analysis in Cellular Manufacturing – Rank Order Clustering Method - Arranging Machines in a GT cell – Hollier Method – Simple Problems.

UNIT IV FLEXIBLE MANUFACTURING SYSTEM (FMS) AND AUTOMATED GUIDED VEHICLE SYSTEM (AGVS) 9

Types of Flexibility - FMS – FMS Components – FMS Application & Benefits – FMS Planning and Control – Quantitative analysis in FMS – Simple Problems. Automated Guided Vehicle System (AGVS) – AGVS Application – Vehicle Guidance technology – Vehicle Management & Safety.

UNIT V INDUSTRIAL ROBOTICS 9

Robot Anatomy and Related Attributes – Classification of Robots- Robot Control systems – End Effectors – Sensors in Robotics – Robot Accuracy and Repeatability - Industrial Robot Applications – Robot Part Programming – Robot Accuracy and Repeatability – Simple Problems.

TOTAL : 45 PERIODS

OUTCOMES:

CO1 Explain the basic concepts of CAD, CAM and computer integrated manufacturing systems
CO2 Summarize the production planning and control and computerized process planning
CO3 Differentiate the different coding systems used in group technology
CO4 Explain the concepts of flexible manufacturing system (FMS) and automated guided vehicle (AGV) system
CO5 Classification of robots used in industrial applications

TEXT BOOKS:

Mikell.P.Groover “Automation, Production Systems and Computer Integrated Manufacturing”, Prentice Hall of India, 2008.

Radhakrishnan P, Subramanyan S.and Raju V., “CAD/CAM/CIM”, 2nd Edition, New Age International (P) Ltd, New Delhi, 2000.

REFERENCES:

Gideon Halevi and Roland Weill, “Principles of Process Planning – A Logical Approach” Chapman & Hall, London, 1995.

Kant Vajpayee S, “Principles of Computer Integrated Manufacturing”, Prentice Hall India.

Rao. P, N Tewari &T.K. Kundra, “Computer Aided Manufacturing”, Tata McGraw Hill Publishing Company, 2000.

ME8074	VIBRATION AND NOISE CONTROL	L	T	P	C
		3	0	0	3

OBJECTIVE:

The student will be able to understand the sources of vibration and noise in automobiles and make design modifications to reduce the vibration and noise and improve the life of the components

UNIT I BASICS OF VIBRATION 9

Introduction, classification of vibration: free and forced vibration, undamped and damped vibration, linear and non linear vibration, response of damped and undamped systems under harmonic force, analysis of single degree and two degree of freedom systems, torsional vibration, determination of natural frequencies.

UNIT II BASICS OF NOISE 9

Introduction, amplitude, frequency, wavelength and sound pressure level, addition, subtraction and averaging decibel levels, noise dose level, legislation, measurement and analysis of noise, measurement environment, equipment, frequency analysis, tracking analysis, sound quality analysis.

UNIT III AUTOMOTIVE NOISE SOURCES 9

Noise Characteristics of engines, engine overall noise levels, assessment of combustion noise, assessment of mechanical noise, engine radiated noise, intake and exhaust noise, engine necessary contributed noise, transmission noise, aerodynamic noise, tire noise, brake noise.

UNIT IV CONTROL TECHNIQUES 9

Vibration isolation, tuned absorbers, un-tuned viscous dampers, damping treatments, application dynamic forces generated by IC engines, engine isolation, crank shaft damping, modal analysis of the mass elastic model shock absorbers.

UNIT V SOURCE OF NOISE AND CONTROL 9

Methods for control of engine noise, combustion noise, mechanical noise, predictive analysis, palliative treatments and enclosures, automotive noise control principles, sound in enclosures, sound energy absorption, sound transmission through barriers

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Summarize the Basics of Vibration
CO2 Summarize the Basics of Noise
CO3 Explain the Sources of Automotive Noise
CO4 Discuss the Control techniques for vibration
CO5 Describe the sources and control of Noise

TEXT BOOK:

1. Singiresu S.Rao, "Mechanical Vibrations", 6th Edition, Pearson Education, 2016.

REFERENCES:

Balakumar Balachandran and Edward B. Magrab, "Fundamentals of Vibrations", 1st Editon, Cengage Learning, 2009
Benson H. Tongue, "Principles of Vibrations", 2nd Edition, Oxford University, 2007
Bernard Challen and Rodica Baranescu - "Diesel Engine Reference Book", Second Edition, SAE International, 1999.
David Bies and Colin Hansen, "Engineering Noise Control – Theory and Practice",4th Edition, E and FN Spon, Taylore & Francise e-Library, 2009
Grover. G.T., "Mechanical Vibrations", Nem Chand and Bros., 2009

EE8091	MICRO ELECTRO MECHANICAL SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES

To provide knowledge of semiconductors and solid mechanics to fabricate MEMS devices.
To educate on the rudiments of Micro fabrication techniques.
To introduce various sensors and actuators
To introduce different materials used for MEMS
To educate on the applications of MEMS to disciplines beyond Electrical and Mechanical engineering.

UNIT I INTRODUCTION **9**

Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication - Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT II SENSORS AND ACTUATORS-I 9 Electrostatic sensors – Parallel plate capacitors – Applications – Interdigitated Finger

capacitor – Comb drive devices – Micro Grippers – Micro Motors - Thermal Sensing and Actuation – Thermal expansion – Thermal couples – Thermal resistors – Thermal Bimorph - Applications – Magnetic Actuators – Micromagnetic components – Case studies of MEMS in magnetic actuators- Actuation using Shape Memory Alloys

UNIT III SENSORS AND ACTUATORS-II **9**

Piezoresistive sensors – Piezoresistive sensor materials - Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , Acoustic, Tactile and Flow sensors.

UNIT IV MICROMACHINING 9

Silicon Anisotropic Etching – Anisotrophic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case studies - Basic surface micro machining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistriction methods – LIGA Process - Assembly of 3D MEMS – Foundry process.

UNIT V POLYMER AND OPTICAL MEMS 9

Polymers in MEMS– Polimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure, Flow and Tactile sensors- Optical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS.

TOTAL : 45 PERIODS

OUTCOMES

Ability to understand and apply basic science, circuit theory, Electro-magnetic field theory control theory and apply them to electrical engineering problems.

Ability to understand and analyse, linear and digital electronic circuits.

TEXT BOOKS:

Chang Liu, "Foundations of MEMS", Pearson Education Inc., 2006.

Stephen D Senturia, "Microsystem Design", Springer Publication, 2000.

Tai Ran Hsu, “MEMS & Micro systems Design and Manufacture” Tata McGraw Hill, New Delhi, 2002.

REFERENCES:

James J.Allen, "Micro Electro Mechanical System Design", CRC Press Publisher, 2010

Julian w. Gardner, Vijay K. Varadan, Osama O. Awadelkarim, "Micro Sensors MEMS and Smart Devices", John Wiley & Son LTD,2002

Mohamed Gad-el-Hak, editor, “ The MEMS Handbook”, CRC press Baco Raton, 2000

Nadim Maluf,“ An Introduction to Micro Electro Mechanical System Design”, Artech House, 2000.

Thomas M.Adams and Richard A.Layton, “Introduction MEMS, Fabrication and Application,” Springer 2012.

GE8076 PROFESSIONAL ETHICS IN ENGINEERING L T P C
3 0 0 3

OBJECTIVE:

To enable the students to create an awareness on Engineering Ethics and Human Values to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES 10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS 9

Senses of ˆEngineering Ethics, – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg,s theory – Gilligan,s theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES 8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

TOTAL: 45 PERIODS

OUTCOME:

Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXT BOOKS:

Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.

REFERENCES:

Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.

Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009.

Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003

Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.

World Community Service Centre, ˆ Value Education,, Vethathiri publications, Erode, 2011.

Web sources:

www.onlineethics.org
www.nspe.org
www.globalethics.org
www.ethics.org

ANNA UNIVERSITY,
CHENNAI

NON-AUTONOMOUS COLLEGES AFFILIATED TO ANNA UNIVERSITY REGULATIONS 2021
CHOICE BASED CREDIT SYSTEM
B.E. INSTRUMENTATION AND CONTROL ENGINEERING CURRICULA AND SYLLABI FOR SEMESTER I & II

SEMESTER – I

S. NO.	COURSE	COURSE TITLE	CATE-	PERIODS PER			TOTAL CONTACT	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
THEORY								
2.	HS3151	Professional English - I	HSMC	3	1	0	4	4
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3	0	0	3	3
5.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
6.	GE3151	Problem Solving and Python Programming	ESC	3	0	0	3	3
PRACTICALS								
7.	GE3171	Problem Solving and Python Programming	ESC	0	0	4	4	2
8.	BS3171	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
			TOTAL	15	2	8	25	21

SEMESTER – II

S. NO.	COURSE	COURSE TITLE	CATE-	PERIODS PER			TOTAL CONTACT	CREDITS
				L	T	P		
THEORY								
1.	HS3251	Professional English - II	HSMC	3	1	0	4	4
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	PH3255	Physics for Instrumentation	BSC	3	0	0	3	3
4.	BE3255	Basic Civil and Mechanical	ESC	3	0	0	3	3
5.	GE3251	Engineering Graphics	ESC	2	0	4	6	4
6.	EE3251	Electric Circuit Analysis	PCC	3	1	0	4	4
7.		NCC Credit Course	-	2	0	0	2	2
PRACTICALS								
8.	GE3271	Engineering Practices Laboratory	ESC	0	0	4	4	2
9.	EE3271	Electric Circuits	PCC	0	0	4	4	2

TOTAL	17	3	12	32	26

*NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

IP3151 INDUCTION PROGRAMME

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc. (ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it everyday for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later. (iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human

Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.

Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

Reference
s:
Guide to Induction program from
AICTE

HS3151 PROFESSIONAL ENGLISH - I L T P C 3 1 0 4

OBJECTIVES :

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
- To use language efficiently in expressing their opinions via various media.

INTRODUCTION TO EFFECTIVE COMMUNICATION 1

What is effective communication? (There are many interesting activities for this.)
Why is communication critical for excellence during study, research and work?
What are the seven C's of effective communication?
What are key language skills?
What is effective listening? What does it involve?
What is effective speaking?
What does it mean to be an excellent reader? What should you be able to do?
What is effective writing?
How does one develop language and communication skills?
What does the course focus on? How are communication and language skills going to be enhanced
during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

UNIT I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 11

Listening –for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form
Speaking - Self Introduction; Introducing a friend; Conversation - politeness strategies; Telephone conversation; Leave a voicemail; Leave a message with another person; asking for information to fill details in a form.
Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails.
Writing - Writing emails / letters introducing
oneself
Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags
Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II NARRATION AND SUMMATION 12

Listening - Listening to podcast, anecdotes / stories / event narration; documentaries and

interviews with celebrities.
Speaking - Narrating personal experiences / events; Interviewing a celebrity; Reporting / and summarising of documentaries / podcasts/ interviews.
Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel
& technical
blogs.
Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions
Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

UNIT III DESCRIPTION OF A PROCESS / PRODUCT 12

Listening - Listen to a product and process descriptions; a classroom lecture;and advertisements about a products.
Speaking – Picture description; Giving instruction to use the product; Presenting a product; and
Summarising a lecture.
Reading – Reading advertisements, gadget reviews; user manuals.
Writing - Writing definitions; instructions; and Product /Process description.
Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers(connectives & sequence words)

UNIT IV CLASSIFICATION AND RECOMMENDATIONS 12

Listening – Listening to TED Talks; Scientific lectures; and educational videos. Speaking – Small Talk; Mini presentations and making recommendations.
Reading – Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc,.)
Writing – Note-making / Note-taking (*Study skills to be taught, not tested); ; Writing recommendations; Transferring information from non verbal (chart , graph etc, to verbal mode) Grammar – Articles; Pronouns - Possessive & Relative pronouns.
Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT V EXPRESSION 12

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking –group discussions, Debates, and Expressing opinions through Simulations & Roleplay. Reading – Reading editorials; and Opinion Blogs;
Writing – Essay Writing (Descriptive or narrative).
Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound
& Complex Sentences.
Vocabulary - Cause & Effect Expressions – Content vs Function words.

TOTAL : 60 PERIODS

OUTCOMES :

At the end of the course, learners will be able

- To listen and comprehend complex academic texts
- To read and infer the denotative and connotative meanings of technical texts
- To write definitions, descriptions, narrations and essays on various topics
- To speak fluently and accurately in formal and informal communicative contexts
- To express their opinions effectively in both oral and written medium of communication

TEXT BOOKS :

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Technical Communication – Principles And Practices, Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3. English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi,2003.

MA3151	MATRICES AND CALCULUS	L	T	P	C
		3	1	0	4

OBJECTIVES :

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I MATRICES 9 + 3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of

Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications : Stretching of an elastic membrane.

UNIT II DIFFERENTIAL CALCULUS 9 + 3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications : Maxima and Minima of functions of one variable.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9 + 3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV INTEGRAL CALCULUS 9 + 3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration : Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications : Hydrostatic force and pressure, moments and centres of mass.

UNIT V MULTIPLE INTEGRALS 9 + 3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications : Moments and centres of mass, moment of inertia.

TOTAL : 60 PERIOD

OUTCOMES :

At the end of the course the students will be able to

- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Able to use differential calculus ideas on several variable functions.
- Apply different methods of integration in solving practical problems.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS :

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition , 2018.

3. James Stewart, " Calculus : Early Transcendentals ", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :

1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
2. Bali. N., Goyal. M. and Watkins. C., " Advanced Engineering Mathematics ", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Jain . R.K. and Iyengar. S.R.K., " Advanced Engineering Mathematics ", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan. S. and Manicavachagom Pillai. T. K., " Calculus " Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., " Higher Engineering Mathematics ", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, " Engineering Mathematics " Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, " Thomas Calculus ", 14th Edition, Pearson India, 2018.

PH3151 ENGINEERING PHYSICS L T P C

3 0 0 3

OBJECTIVES:

- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to be successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT I MECHANICS 9

Multiparticle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic

molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

UNIT II ELECTROMAGNETIC WAVES 9

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS 9

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems
- waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference –
Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics -
Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser,
CO_2 laser, semiconductor laser –Basic applications of lasers in industry.

UNIT IV BASIC QUANTUM MECHANICS 9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.

UNIT V APPLIED QUANTUM MECHANICS 9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

TOTAL : 45 PERIODS

OUTCOMES:

After completion of this course, the students should be able to

- Understand the importance of mechanics.
- Express their knowledge in electromagnetic waves.
- Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
- Understand the importance of quantum physics.
- Comprehend and apply quantum mechanical principles towards the formation of energy

bands.

TEXT BOOKS:

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw-Hill (Indian Edition), 2017.

REFERENCES:

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer- Verlag, 2012.

CY3151 ENGINEERING CHEMISTRY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

UNIT I WATER AND ITS TREATMENT 9

Water: Sources and impurities, Water quality parameters: Definition and significance of-colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralisation and zeolite process.

UNIT II NANOCHEMISTRY 9

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT III PHASE RULE AND COMPOSITES 9

Phase rule:Introduction, definition of terms with examples. One component system - water system;

Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process.

Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials

(Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; Power alcohol and biodiesel.

Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive

range; Flue gas analysis - ORSAT Method. CO_2 emission and carbon foot print.

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar

cells; Recent developments in solar cell materials. Wind energy; Geothermal energy;Batteries:

Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion- battery; Electric vehicles-working principles; Fuel cells: H_2-O_2 fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students will be able:

- To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.

- To apply the knowledge of phase rule and composites for material selection requirements.
- To recommend suitable fuels for engineering processes and applications.
- To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

GE3151 PROBLEM SOLVING AND PYTHON PROGRAMMING L T P C
3 0 0

OBJECTIVES:

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING 9

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems. CO2: Develop and execute simple Python programs.

CO3: Write simple Python programs using conditionals and looping for solving problems. CO4: Decompose a Python program into functions.

CO5: Represent compound data using Python lists, tuples, dictionaries etc. CO6: Read and write data from/to files in Python programs.

TEXT BOOKS:

1. Allen B. Downey, "Think Python : How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press , 2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

HS3251 PROFESSIONAL ENGLISH - II L T P C
3 1 0 4

OBJECTIVES :

- To engage learners in meaningful language activities to improve their LSRW skills
- To enhance learners' awareness of general rules of writing for specific audiences
- To help learners understand the purpose, audience, contexts of different types of writing
- To develop analytical thinking skills for problem solving in communicative contexts
- To demonstrate an understanding of job applications and interviews for internship and placements

UNIT I MAKING COMPARISONS
12

Listening – Evaluative Listening: Advertisements, Product Descriptions, -Audio / video; Listening and filling a Graphic Organiser (Choosing a product or service by comparison) Speaking – Marketing a product, Persuasive Speech
Techniques. Reading - Reading advertisements, user
manuals, brochures;
Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed
Tenses, Prepositional phrases
Vocabulary – Contextual meaning of words

UNIT II EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING
12

Listening - Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects - Speaking – Describing and discussing the reasons of accidents or disasters based on news reports. Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint, Writing - Writing responses to complaints.
Grammar - Active Passive Voice transformations, Infinitive and Gerunds Vocabulary – Word
Formation (Noun-Verb-Adj-Adv), Adverbs.

UNIT III PROBLEM SOLVING
12

Listening – Listening to / Watching movie scenes/ documentaries depicting a technical problem and suggesting solutions.
Speaking – Group Discussion(based on case studies), - techniques and Strategies,
Reading - Case Studies, excerpts from literary texts, news reports etc.,
Writing – Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay
Grammar -– Errorcorrection; If conditional sentences
Vocabulary - Compound Words, Sentence Completion.

UNIT IV REPORTING OF EVENTS AND RESEARCH 12

Listening – Listening Comprehension based on news reports – and documentaries – Precise writing, Summarising, Speaking –Interviewing, Presenting an oral report, Mini presentations on select topics; Reading –Newspaper articles; Writing – Recommendations, Transcoding, Accident Report, Survey Report Grammar – Reported Speech, Modals Vocabulary – Conjunctions- use of prepositions

UNIT V THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY 12

Listening – Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance);

Speaking – Participating in a Role play, (interview/telephone interview), virtual interviews, Making presentations with visual aids;

Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses Vocabulary – Idioms.

TOTAL : 60 PERIODS

OUTCOMES:

At the end of the course, learners will be able

- To compare and contrast products and ideas intechnical texts.
- To identify cause and effects in events, industrial processes through technical texts
- To analyse problems in order to arrive at feasible solutions and communicate them orally and in the written format.
- To report events and the processes of technical and industrial nature.
- To present their opinions in a planned and logical manner, and draft effective resumes in context of job search.

TEXT BOOKS :

1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd.
   Department of English, Anna University.
2. English for Science & Technology Cambridge University Press 2021.
   Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press.
   New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, NewDelhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata

McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd.
1990, Delhi.

MA3251 STATISTICS AND NUMERICAL METHODS L T P C

3 1 0 4

OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 9 + 3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS 9 + 3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9 + 3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9 +3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation

polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9 +3

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.
- Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., " Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

PH3255 PHYSICS FOR INSTRUMENTATION ENGINEERING

(Common to E & I and I & C) L T P C
3 0 0 3

OBJECTIVES:

- To make the students to understand the basics of electricity and magnetism and vectors.
- To understand the electrical properties of materials including free electron theory, applications of quantum mechanics and magnetic materials.
- To instil knowledge on physics of semiconductors, determination of charge carriers and device applications
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications
- To inculcate an idea of significance of nano structures, quantum confinement and ensuing nano device applications.

UNIT I ELECTRICITY AND MAGNETISM 9

Coulomb's law, electric field intensity, electric flux density, Gauss' law, divergence, electric field and potential due to point, line, plane, and spherical charge distributions, effect of the dielectric medium, capacitance of simple configurations, Biot-Savart's law, Ampere's law, curl, Faraday's law, Lorentz force, Inductance, Magneto motive force, reluctance, magnetic circuits, self and mutual inductance of simple configurations.

UNIT II ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Quantum free electron theory :Tunneling – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole. Magnetic materials: Dia, para and ferromagnetic effects – paramagnetism in the conduction electrons in metals – exchange interaction and ferromagnetism – quantum interference devices – GMR devices.

UNIT III SEMICONDUCTORS AND TRANSPORT PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain. Optical processes in quantum wells – Optoelectronic devices: light detectors and solar cells – light emitting diode – laser diode - optical processes in organic semiconductor devices –excitonic state – Electro-optics and nonlinear optics: Modulators and switching

devices – plasmonics.

UNIT V NANODEVICES AND QUANTUM COMPUTING 9

Introduction - quantum confinement – quantum structures: quantum wells, wires and dots — band gap of nanomaterials. Tunneling – Single electron phenomena: Coulomb blockade - resonant- tunneling diode – single electron transistor – quantum cellular automata - Quantum system for information processing - quantum states – classical bits – quantum bits or qubits –CNOT gate - multiple qubits – Bloch sphere – quantum gates – advantage of quantum computing over classical computing.

TOTAL: 45 PERIODS

OUTCOMES :

At the end of the course, the students should be able to

- know basics of electricity and magnetism and the influence of vectors in EMT.
- gain knowledge on the electrical and magnetic properties of materials and their applications
- understand clearly of semiconductor physics and functioning of semiconductor devices
- understand the optical properties of materials and working principles of various optical devices
- appreciate the importance of nanotechnology and nanodevices.

TEXT BOOKS :

1. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.
2. R.F.Pierret. Semiconductor Device Fundamentals. Pearson (Indian Edition), 2006.
3. G.W.Hanson. Fundamentals of Nanoelectronics. Pearson Education (Indian Edition), 2009.

REFERENCES :

1. Matthew N. O. Sadiku, Principles of Electromagnetics, Oxford Univ.Press 2015.
2. Jasprit Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw- Hill Education (Indian Edition), 2019.
3. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
4. Mark Fox, Optical Properties of Solids, Oxford Univ.Press, 2001.
5. Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-Hill Education (Indian Edition), 2020.

BE3255 BASIC CIVIL AND MECHANICAL ENGINEERING L T P C

3 0 0 3

OBJECTIVES:

- To provide the students an illustration of the significance of the Civil and Mechanical Engineering Profession in satisfying the societal needs.

- To help students acquire knowledge in the basics of surveying and the materials used for construction.
- To provide an insight to the essentials of components of a building and the infrastructure facilities.
- To explain the component of power plant units and detailed explanation to IC engines their working principles.
- To explain the Refrigeration & Air-conditioning system.

UNIT I PART A: OVERVIEW OF CIVIL ENGINEERING 5

Civil Engineering contributions to the welfare of Society - Specialized sub disciplines in Civil Engineering – Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering – National building code – terminologists: Plinth area, Carpet area, Floor area, Buildup area, Floor space index - Types of buildings: Residential buildings, Industrial buildings.

UNIT I PART B: OVERVIEW OF MECHANICAL ENGINEERING 4

Overview of Mechanical Engineering - Mechanical Engineering Contributions to the welfare of Society –Specialized sub disciplines in Mechanical Engineering – Manufacturing, Automation, Automobile and Energy Engineering - Interdisciplinary concepts in Mechanical Engineering.

UNIT II SURVEYING AND CIVIL ENGINEERING MATERIALS 9

Surveying: Objects – Classification – Principles – Measurements of Distances and angles – Leveling – Determination of areas– Contours.

Civil Engineering Materials: Bricks – Stones – Sand – Cement – Concrete – Steel - Timber - Modern

Materials, Thermal and Acoustic Insulating Materials, Decorative Panels, Water Proofing Materials. Modern uses of Gypsum, Pre-fabricated Building component (brief discussion only)

UNIT III BUILDING COMPONENTS AND INFRASTRUCTURE 9

Building plans – Setting out of a Building - Foundations: Types of foundations - Bearing capacity and settlement – Brick masonry – Stone Masonry – Beams – Columns – Lintels – Roofing – Flooring – Plastering.

Types of Bridges and Dams – Water Supply Network - Rain Water Harvesting – Solid Waste

Management - Introduction to Highways and Railways - Introduction to Green Buildings.

UNIT IV INTERNAL COMBUSTION ENGINES AND POWER PLANTS 9

Classification of Power Plants- Working principle of steam, Gas, Diesel, Hydro -electric and Nuclear Power plants- Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines. Working principle of Boilers-Turbines, Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps, Concept

of hybrid engines. Industrial safety practices and protective devices

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 9

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system–Layout of typical domestic refrigerator–Window and Split type room Air conditioner. Properties of air - water mixture, concepts of psychometric and its process.

TOTAL: 45 PERIODS

OUTCOMES:

CO1: Understanding profession of Civil and Mechanical engineering.
CO2: Summarise the planning of building, infrastructure and working of Machineries. CO3: Apply the knowledge gained in respective discipline
CO4: Illustrate the ideas of Civil and Mechanical Engineering applications.
CO5: Appraise the material, Structures, machines and energy.

TEXT BOOKS:

1. G Shanmugam, M S Palanichamy, Basic Civil and Mechanical Engineering, McGraw Hill Education; First edition, 2018

REFERENCES:

1. Palanikumar, K. Basic Mechanical Engineering, ARS Publications, 2018.
2. Ramamrutham S., "Basic Civil Engineering", Dhanpat Rai Publishing Co.(P) Ltd, 2013.
3. Seetharaman S., "Basic Civil Engineering", Anuradha Agencies, 2005.
4. Shantha Kumar SRJ., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, 2000
.

GE3251 ENGINEERING GRAPHICS

L	T	P	C
2	0	4	4

OBJECTIVES:

The main learning objective of this course is to prepare the students for:

1. Drawing engineering curves.
2. Drawing freehand sketch of simple objects.
3. Drawing orthographic projection of solids and section of solids.
4. Drawing development of solids
5. Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications — Use of drafting instruments — BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING 6+12

Basic Geometrical constructions, Curves used in engineering practices: Conics —

Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 6+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.

Practicing three dimensional modeling of simple objects by CAD Software(Not for examination)

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6 +12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.

Practicing three dimensional modeling of simple objects by CAD Software(Not for examination)

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12

Principles of isometric projection — isometric scale —Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

Practicing three dimensional modeling of isometric projection of simple objects by CAD Software(Not for examination)

TOTAL: (L=30+P=60) 90 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

- Use BIS conventions and specifications for engineering drawing.
- Construct the conic curves, involutes and cycloid.
- Solve practical problems involving projection of lines.
- Draw the orthographic, isometric and perspective projections of simple solids.
- Draw the development of simple solids.

TEXT BOOK:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

REFERENCES:

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition,2017.
3. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
6. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

Publication of Bureau of Indian Standards:

1. IS 10711 — 2001: Technical products Documentation — Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) — 2001: Technical products Documentation — Lettering.
3. IS 10714 (Part 20) — 2001 & SP 46 — 2003: Lines for technical drawings.
4. IS 11669 — 1986 & SP 46 —2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) — 2001: Technical drawings — Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

EE3251 ELECTRIC CIRCUIT ANALYSIS L T P C
3 1 0 4

OBJECTIVES:

- To introduce electric circuits and its analysis
- To provide key concepts to analyze and understand electrical circuits
- To impart knowledge on solving circuit equations using network theorems
- To educate on obtaining the transient response of circuits.
- To introduce the phenomenon of resonance in coupled circuits.
- To introduce Phasor diagrams and analysis of single &three phase circuits

UNIT I BASIC CIRCUITS ANALYSIS 9+3

Fundamentals concepts of R, L and C elements-Energy Sources- Ohm's Law -Kirchhoff 's Laws – DC Circuits – Resistors in series and parallel circuits - A.C Circuits – Average and RMS Value – Complex Impedance – Phasor diagram - Real and Reactive Power, Power Factor, Energy -Mesh current and node voltage methods of analysis D.C and A.C Circuits.

UNIT II NETWORK REDUCTION AND THEOREMS FOR DC AND AC CIRCUITS 9+3

Network reduction: voltage and current division, source transformation – star delta conversion. Theorems – Superposition, Thevenin's and Norton's Theorem – Maximum power transfer theorem – Reciprocity Theorem – Millman's theorem- Tellegen's Theorem-Statement, application to DC and AC Circuits.

UNIT III TRANSIENT RESPONSE ANALYSIS 9+3

Introduction – Laplace transforms and inverse Laplace transforms- standard test signals - Transient response of RL, RC and RLC circuits using Laplace transform for Source free, Step input and Sinusoidal input.

UNIT IV RESONANCE AND COUPLED CIRCUITS 9+3

Series and parallel resonance –frequency response – Quality factor and Bandwidth – Self and mutual inductance – Coefficient of coupling – Dot rule-Analysis of coupled circuits– Single Tuned circuits..

UNIT V THREE PHASE CIRCUITS 9+3

Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced and unbalanced – phasor diagram of voltages and currents – power measurement in three phase circuits– Power Factor Calculations.

TOTAL: 60 PERIODS

OUTCOMES:

After completing this course, the students will be able to: CO1: Explain circuit's behavior using circuit laws.

CO2: Apply mesh analysis/ nodal analysis / network theorems to determine behavior of

the given
DC and AC circuit

CO3: Compute the transient response of first order and second order systems to step and sinusoidal input

CO4: Compute power, line/ phase voltage and currents of the given three phase circuit

CO5: Explain the frequency response of series and parallel RLC circuits

CO6: Explain the behavior of magnetically coupled circuits.

TEXT BOOKS:

1. William H. HaytJr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill publishers, 9th edition, New Delhi, 2020.

2. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2019.

3. Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning India, 2013.

REFERENCES

1. Chakrabarti A, "Circuits Theory (Analysis and synthesis), Dhanpat Rai& Sons, New Delhi, 2020.

2 Joseph A. Edminister, Mahmood Nahvi, "Electric circuits", Schaum's series, McGraw-Hill, First Edition, 2019.

4. M E Van Valkenburg, "Network Analysis",Prentice-Hall of India Pvt Ltd, New Delhi, 2015.

5. Richard C. Dorf and James A. Svoboda, "Introduction to Electric Circuits", 7th Edition, John Wiley & Sons, Inc. 2018.

6. Sudhakar A and Shyam Mohan SP, "Circuits and Networks Analysis and Synthesis", McGraw Hill, 2015.

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. INSTRUMENTATION AND CONTROL ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM

Educational Objectives

Bachelor of Instrumentation and Control Engineering curriculum is designed to prepare the graduates having attitude and knowledge to

1. **Have successful technical and professional careers in their chosen fields such as Process Control, Electronics & Information Technology.**
2. **Engross in life long process of learning to keep themselves abreast of new developments in the field of Electronics & Instrumentation**

Apply the Mathematical knowledge and the basics of Science and Engineering to solve the problems pertaining to Electronics and Instrumentation Engineering.

Identify and formulate Instrumentation Engineering problems from research literature and be able to analyze the problem using first principles of Mathematics and Engineering Sciences.

Come out with solutions for the complex problems and to design system components or process that fulfill the particular needs taking into account public health and safety and the social, cultural and environmental issues.

Draw well-founded conclusions applying the knowledge acquired from research and research methods including design of experiments, analysis and interpretation of data and synthesis of information and to arrive at significant conclusion.

Form, select and apply relevant techniques, resources and Engineering and IT tools for Engineering activities like electronic prototyping, modeling and control of systems/processes and also being conscious of the limitations.

Understand the role and responsibility of the Professional Instrumentation Engineer and to assess societal, health, safety issues based on the reasoning received from the contextual knowledge.

Be aware of the impact of professional Engineering solutions in societal and environmental contexts and exhibit the knowledge and the need for sustainable Development.

Apply the principles of Professional Ethics to adhere to the norms of the engineering practice and to discharge ethical responsibilities.

Function actively and efficiently as an individual or a member/leader of different teams and multidisciplinary projects.

Communicate efficiently the engineering facts with a wide range of engineering community and others, to understand and prepare reports and design documents; to make effective presentations and to frame and follow instructions.

Demonstrate the acquisition of the body of engineering knowledge and insight and Management Principles and to apply them as member / leader in teams and multidisciplinary environments.

Recognize the need for self and life-long learning, keeping pace with technological challenges in the broadest sense.

PEO \ PO	a	b	c	d	e	f	g	h	i	j	k	l
1												
2												

SEMESTER	NAME OF THE SUBJECT	PROGRAM OUTCOMES											
		a	b	c	d	e	f	g	h	i	j	k	l
	THEORY												
SEM I	Communicative English												
	Engineering Mathematics - I												
	Engineering Physics												
	Engineering Chemistry												
	Problem Solving and Python programming												
	Engineering Graphics												
	PRACTICAL												
	Problem Solving and Python Programming Laboratory												
	Physics and Chemistry Laboratory												
	THEORY												
SEM II	Technical English												
	Engineering Mathematics - II												
	Physics For Electronics Engineering												
	Basic Civil and Mechanical Engineering												
	Circuit Theory												
	Environmental Science and Engineering												
	PRACTICALS												
	Engineering Practices Laboratory												
	Electric Circuits Laboratory												
	THEORY												
SEM III	Transforms and Partial Differential Equations												
	Electron Devices and Circuits												
	Digital Logic Circuits												
	Electrical Measurements												
	Transducers Engineering												
	Object Oriented Programming												

		PRACTICALS
		Measurements and Transducers Laboratory
		Object Oriented Programming Laboratory
		THEORY
SEM IV		**Numerical Methods**
		Electrical Machines
		Industrial Instrumentation - I
		Linear integrated Circuit and Applications
		Control Systems
		Communication Engineering
		PRACTICALS
		Devices and Machines Laboratory
		Linear and Digital integrated Circuits Laboratory
		THEORY
SEM V		**Analytical Instruments**
		Industrial Instrumentation - II
		Process Control
		Microprocessors and Microcontrollers
		Unit Operation and Control
		Open Elective I
		PRACTICALS
		Industrial Instrumentation Laboratory
		Microprocessors and Microcontrollers Laboratory
		THEORY
SEM VI		**Advanced Control System**
		Logic and Distributed Control System
		Data Structures

	Thermal Power Plant Instrumentation												
	Professional Elective I												
	Professional Elective II												
	PRACTICALS												
	Data Structures Laboratory												
	Process Control Laboratory												
	Professional Communication												
	THEORY												
SEM VII	**Industrial Data Networks**												
	Instrumentation in Petrochemical Industries												
	Digital Image Processing												
	Professional Elective III												
	Professional Elective IV												
	Open Elective II												
	PRACTICALS												
	Industrial Automation Laboratory												
	Instrumentation System Design Laboratory												
	THEORY												
SEM VIII	**Professional Elective V**												
	Professional Elective VI												
	PRACTICALS												
	Project Work												

PROFESSIONAL ELECTIVE

SL.NO.	**NAME OF THE SUBJECT**	**PROGRAM OUTCOMES**											
		a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	i	j	**k**	l
	THEORY												
ELECTIVE – I	**MEMS and Nano Science**												
	Power Electronics and Drives												
	System Identification												

	Computer Networks												
	Intellectual Property Rights												
ELECTIVE – II	**Advanced Instrumentation Systems**												
	Adaptive Control												
	Applied Soft Computing												
ELECTIVE – III	**Fibre Optics and Laser Instrumentation**												
	Electromagnetic Theory												
	Disaster Management												
	Human Rights												
	Operations Research												
	Foundation Skills in Integrated Product Development												
ELECTIVE – IV	**Computer Control of Processes**												
	Electronic Instrumentation												
	Optimal Control												
	Radar and Navigational Aids												
	Total Quality Management												
	VLSI Design												
ELECTIVE – V	**Embedded Systems**												
	Biomedical Instrumentation												
	Digital Signal Processing												
	Professional Ethics in Engineering												
	Principles of Management												
ELECTIVE – VI													
	Project Management and Finance												
	Advanced Process Control												
	Robotics and Automation												
	Fundamentals of Nano Science												

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CHOICE BASED CREDIT SYSTEM
I TO VIII SEMESTERS CURRICULA & SYLLABI

SEMESTER I

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	MA8151	Engineering Mathematics - I	BS	4	4	0	0	4
3.	PH8151	Engineering Physics	BS	3	3	0	0	3
4.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
6.	GE8152	Engineering Graphics	ES	6	2	0	4	4
PRACTICALS								
7.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
8.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
			TOTAL	31	19	0	12	25

SEMESTER II

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8251	Technical English	HS	4	4	0	0	4
2.	MA8251	Engineering Mathematics -II	BS	4	4	0	0	4
3.	PH8253	Physics for Electronics Engineering	BS	3	3	0	0	3
4.	BE8252	Basic Civil and Mechanical Engineering	ES	4	4	0	0	4
5.	EE8251	Circuit Theory	PC	4	2	2	0	3
6.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
PRACTICALS								
7.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
8.	EE8261	Electric Circuits Laboratory	PC	4	0	0	4	2
			TOTAL	30	20	2	8	25

SEMESTER III

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
2.	EC8353	Electron Devices and Circuits	ES	3	3	0	0	3
3.	EE8351	Digital Logic Circuits	PC	4	2	2	0	3
4.	EI8351	Electrical Measurements	PC	4	2	2	0	3
5.	EI8352	Transducers Engineering	PC	3	3	0	0	3
6.	CS8392	Object Oriented Programming	ES	3	3	0	0	3
PRACTICALS								
7.	EI8361	Measurements and Transducers Laboratory	PC	4	0	0	4	2
8.	CS8383	Object Oriented Programming Laboratory	ES	4	0	0	4	2
			TOTAL	29	17	4	8	23

SEMESTER IV

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8491	Numerical Methods	BS	4	4	0	0	4
2.	EI8451	Electrical Machines	ES	3	3	0	0	3
3.	EI8452	Industrial Instrumentation - I	PC	3	3	0	0	3
4.	EE8451	Linear Integrated Circuits and Applications	PC	3	3	0	0	3
5.	IC8451	Control Systems	PC	5	3	2	0	4
6.	EC8395	Communication Engineering	ES	3	3	0	0	3
PRACTICALS								
7.	EI8461	Devices and Machines Laboratory	PC	4	0	0	4	2
8.	EE8461	Linear and Digital Integrated Circuits Laboratory	PC	4	0	0	4	2
			TOTAL	29	19	2	8	24

SEMESTER V

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EI8551	Analytical Instruments	PC	3	3	0	0	3
2.	EI8552	Industrial Instrumentation - II	PC	3	3	0	0	3
3.	EI8553	Process Control	PC	4	2	2	0	3
4.	EE8551	Microprocessors and Microcontrollers	PC	3	3	0	0	3
5.	EI8093	Unit Operation and Control	PC	3	3	0	0	3
6.		Open Elective I*	OE	3	3	0	0	3
PRACTICALS								
7.	EI8561	Industrial Instrumentation Laboratory	PC	4	0	0	4	2
8.	EE8681	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
			TOTAL	27	17	2	8	22

SEMESTER VI

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	IC8651	Advanced Control System	PC	4	2	2	0	3
2.	EI8651	Logic and Distributed Control System	PC	3	3	0	0	3
3.	CS8391	Data Structures	ES	3	3	0	0	3
4.	EI8092	Thermal Power Plant Instrumentation	PC	3	3	0	0	3
5.		Professional Elective I	PE	3	3	0	0	3
6.		Professional Elective II	PE	3	3	0	0	3
PRACTICALS								
7.	CS8381	Data Structures Laboratory	ES	4	0	0	4	2
8.	EI8661	Process Control Laboratory	PC	4	0	0	4	2
9.	HS8581	Professional Communication	EEC	2	0	0	2	1
			TOTAL	29	17	2	10	23

SEMESTER VII

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EI8751	Industrial Data Networks	PC	3	3	0	0	3
2.	EI8091	Instrumentation in Petrochemical Industries	PC	3	3	0	0	3
3.	EC8093	Digital Image Processing	PC	3	3	0	0	3
4.		Professional Elective III	PE	3	3	0	0	3
5.		Professional Elective IV	PE	3	3	0	0	3
6.		Open Elective II*	OE	3	3	0	0	3
PRACTICALS								
7.	EI8761	Industrial Automation Laboratory	PC	4	0	0	4	2
8.	EI8762	Instrumentation System Design Laboratory	PC	4	0	0	4	2
			TOTAL	26	18	0	8	22

SEMESTER VIII

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Professional Elective V	PE	3	3	0	0	3
2.		Professional Elective VI	PE	3	3	0	0	3
PRACTICALS								
3.	IC8811	Project Work	EEC	20	0	0	20	10
			TOTAL	26	6	0	20	16

TOTAL NO. OF CREDITS:180

***Course from the curriculum of other UG Programmes.**

PROFESSIONAL ELECTIVE – I (VI SEMESTER)

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EE8072	MEMS and Nano Science	PE	3	3	0	0	3
2.	EI8077	Power Electronics and Drives	PE	3	3	0	0	3
3.	IC8072	System Identification	PE	4	2	2	0	3
4.	EI8074	Computer Networks	PE	4	2	2	0	3
5.	GE8075	Intellectual Property Rights	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – II (VI SEMESTER)

1.	EI8071	Adaptive Control	PE	4	2	2	0	3
2.	EI8072	Advanced Instrumentation Systems	PE	3	3	0	0	3
3.	EE8071	Applied Soft Computing	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – III (VII SEMESTER)

1.	EI8075	Fibre Optics and Laser Instrumentation	PE	3	3	0	0	3
2.	EE8391	Electromagnetic Theory	PE	4	2	2	0	3
3.	GE8071	Disaster Management	PE	3	3	0	0	3
4.	GE8074	Human Rights	PE	3	3	0	0	3
5.	MG8491	Operations Research	PE	3	3	0	0	3
6.	GE8072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – IV (VII SEMESTER)

1.	EI8691	Computer Control of Processes	PE	3	3	0	0	3
2.	EI8692	Electronic Instrumentation	PE	3	3	0	0	3
3.	EI8076	Optimal Control	PE	4	2	2	0	3
4.	TL8071	Radar and Navigational Aids	PE	3	3	0	0	3
5.	GE8077	Total Quality Management	PE	3	3	0	0	3
6.	EC8095	VLSI Design	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – V (VIII SEMESTER)

1.	EE8691	Embedded Systems	PE	3	3	0	0	3
2.	EI8073	Biomedical Instrumentation	PE	3	3	0	0	3
3.	EE8591	Digital Signal Processing	PE	4	2	2	0	3
4.	GE8076	Professional Ethics in Engineering	PE	3	3	0	0	3
5.	MG8591	Principles of Management	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – VI (VIII SEMESTER)

1.	EI8078	Project Management and Finance	PE	3	3	0	0	3
2.	IC8071	Advanced Process Control	PE	4	2	2	0	3
3.	EI8079	Robotics and Automation	PE	3	3	0	0	3
4.	GE8073	Fundamentals of Nanoscience	PE	3	3	0	0	3

***Professional Electives are grouped according to elective number as was done previously.**

HUMANITIES AND SOCIALSCIENCES (HS)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	HS8251	Technical English	HS	4	4	0	0	4
3.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3

BASIC SCIENCES (BS)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA8151	Engineering Mathematics I	BS	4	4	0	0	4
2.	PH8151	Engineering Physics	BS	3	3	0	0	3
3.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
4.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
5.	MA8251	Engineering Mathematics II	BS	4	4	0	0	4
6.	PH8253	Physics for Electronics Engineering	BS	3	3	0	0	3
7.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
8.	MA8491	Numerical Methods	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
GE8151	Problem Solving and Python Programming		ES	3	3	0	0	3
2.	GE8152	Engineering Graphics	ES	6	2	0	4	4
3.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
4.	BE8252	Basic Civil and Mechanical Engineering	ES	4	4	0	0	4
5.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
6.	EC8353	Electron Devices and Circuits	ES	3	3	0	0	3
7.	CS8392	Object Oriented	ES	3	3	0	0	3

		Programming						
8.	CS8383	Object Oriented Programming Laboratory	ES	4	0	0	4	2
9.	EI8451	Electrical Machines	ES	3	3	0	0	3
10.	EC8395	Communication Engineering	ES	3	3	0	0	3
11.	CS8391	Data Structures	ES	3	3	0	0	3
12.	CS8381	Data Structures Laboratory	ES	4	0	0	4	2

PROFESSIONAL CORE (PC)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EE8251	Circuit Theory	PC	4	2	2	0	3
2.	EE8261	Electric Circuits Laboratory	PC	4	0	0	4	2
3.	EE8351	Digital Logic Circuits	PC	4	2	2	0	3
4.	EI8351	Electrical Measurements	PC	4	2	2	0	3
5.	EI8352	Transducers Engineering	PC	3	3	0	0	3
EI8361		Measurements and Transducers Laboratory	PC	4	0	0	4	2
7.	EI8452	Industrial Instrumentation - I	PC	3	3	0	0	3
8.	EE8451	Linear integrated Circuits and Applications	PC	3	3	0	0	3
9.	IC8451	Control Systems	PC	5	3	2	0	4
10.	EI8461	Devices and Machines Laboratory	PC	4	0	0	4	2
11.	EE8461	Linear and Digital Integrated Circuits Laboratory	PC	4	0	0	4	2
12.	EI8551	Analytical Instruments	PC	3	3	0	0	3
13.	EI8552	Industrial Instrumentation - II	PC	3	3	0	0	3
14.	EI8553	Process Control	PC	4	2	2	0	3
15.	EE8551	Microprocessors and Microcontrollers	PC	3	3	0	0	3
16.	EI8093	Unit Operation and Control	PC	3	3	0	0	3
17.	EI8561	Industrial Instrumentation Laboratory	PC	4	0	0	4	2
18.	EE8681	Microprocessors and	PC		0	0	4	2

		Microcontrollers Laboratory		4				
19.	IC8651	Advanced Control System	PC	4	2	2	0	3
20.	EI8651	Logic and Distributed Control System	PC	3	3	0	0	3
21.	EI8092	Thermal Power Plant Instrumentation	PC	3	3	0	0	3
22.	EI8661	Process Control Laboratory	PC	4	0	0	4	2
23.	EI8751	Industrial Data Networks	PC	3	3	0	0	3
24.	EI8091	Instrumentation in Petrochemical Industries	PC	3	3	0	0	3
25.	EC8093	Digital Image Processing	PC	3	3	0	0	3
26.	EI8761	Industrial Automation Laboratory	PC	4	0	0	4	2
27.	EI8762	Instrumentation System Design Laboratory	PC	4	0	0	4	2

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8581	Professional Communication	EEC	2	0	0	2	1
2.	IC8811	Project work	EEC	20	0	0	20	10

SUMMARY

S.NO.	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL
		I	II	III	IV	V	VI	VII	VIII	
1.	HS	4	7	-	-		-	-		11
2.	BS	12	7	4	4		-	-		27
3.	ES	9	6	8	6	-	5	-		34
4.	PC	-	5	11	14	19	11	13		73
5.	PE						6	6	6	18
6.	OE					3		3	-	6
7.	EEC						1		10	11
	Total	25	25	23	24	22	23	22	16	180
	Non Credit / Mandatory	-	-	-	-	-	-	-	-	0

HS8151 COMMUNICATIVE ENGLISH L T P C 4004

OBJECTIVES:

To develop the basic reading and writing skills of first year engineering and technology students.

To help learners develop their listening skills, which will, enable them listen to lectures and comprehend them by asking questions; seeking clarifications.

To help learners develop their speaking skills and speak fluently in real contexts.

To help learners develop vocabulary of a general kind by developing their reading skills

UNIT I SHARING INFORMATION RELATED TO ONESELF/FAMILY& FRIENDS 12

Reading- short comprehension passages, practice in skimming-scanning and predicting- Writing-completing sentences- - developing hints. Listening- short texts- short formal and informal conversations. Speaking- introducing oneself - exchanging personal information- Language development- Wh- Questions- asking and answering-yes or no questions- parts of speech. Vocabulary development-- prefixes- suffixes- articles.- count/ uncount nouns.

UNIT II GENERAL READING AND FREE WRITING 12

Reading - comprehension-pre-reading-post reading- comprehension questions (multiple choice questions and /or short questions/ open-ended questions)-inductive reading- short narratives and descriptions from newspapers including dialogues and conversations (also used as short Listening texts)- register- Writing – paragraph writing- topic sentence- main ideas- free writing, short narrative descriptions using some suggested vocabulary and structures –Listening- telephonic conversations. Speaking – sharing information of a personal kind—greeting – taking leave- Language development – prepositions, conjunctions Vocabulary development- guessing meanings of words in context.

UNIT IIIGRAMMAR AND LANGUAGE DEVELOPMENT 12

Reading- short texts and longer passages (close reading) Writing- understanding text structure- use of reference words and discourse markers-coherence-jumbled sentences Listening – listening to longer texts and filling up the table- product description- narratives from different sources. Speaking-asking about routine actions and expressing opinions. Language development- degrees of comparison- pronouns- direct vs indirect questions- Vocabulary development – single word substitutes- adverbs.

UNIT IV READING AND LANGUAGE DEVELOPMENT 12

Reading- comprehension-reading longer texts- reading different types of texts- magazines Writing-letter writing, informal or personal letters-e-mails-conventions of personal email- Listening- listening to dialogues or conversations and completing exercises based on them. Speaking- speaking about oneself- speaking about one's friend- Language development- Tenses- simple present-simple past-present continuous and past continuous- Vocabulary development- synonyms-antonyms- phrasal verbs

UNIT V EXTENDED WRITING 12

Reading- longer texts- close reading –Writing- brainstorming -writing short essays – developing an outline- identifying main and subordinate ideas- dialogue writing-Listening – listening to talks-conversations- Speaking – participating in conversations- short group conversations-Language development-modal verbs- present/ past perfect tense - Vocabulary development-collocations-fixed and semi-fixed expressions

TOTAL: 60 PERIODS

OUTCOMES: At the end of the course, learners will be able to:

Read articles of a general kind in magazines and newspapers.
Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.
Comprehend conversations and short talks delivered in English
Write short essays of a general kind and personal letters and emails in English.

TEXT BOOKS:

Board of Editors. Using English A Coursebook for Undergarduate Engineers and Technologists. Orient BlackSwan Limited, Hyderabad: 2015
Richards, C. Jack. Interchange Students' Book-2 New Delhi: CUP, 2015.

REFERENCES

Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge,2011.
Comfort, Jeremy, et al. Speaking Effectively : Developing Speaking Skillsfor BusinessEnglish. Cambridge University Press, Cambridge: Reprint 2011
Dutt P. Kiranmai and RajeevanGeeta. Basic Communication Skills, Foundation Books: 2013
Means,L. Thomas and Elaine Langlois. English & Communication For Colleges. CengageLearning ,USA: 2007
Redston, Chris &Gillies Cunningham Face2Face (Pre-intermediate Student's Book& Workbook) Cambridge University Press, New Delhi: 2005

MA8151	ENGINEERING MATHEMATICS – I	L	T	P	C
		4	0	0	4

OBJECTIVES :

The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT IDIFFERENTIAL CALCULUS 12

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT III INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

UNIT V DIFFERENTIAL EQUATIONS 12

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients - Method of undetermined coefficients.

TOTAL : 60 PERIODS

OUTCOMES :

After completing this course, students should demonstrate competency in the following skills:

Use both the limit definition and rules of differentiation to differentiate functions. Apply differentiation to solve maxima and minima problems.
Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.
Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.
Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.
Apply various techniques in solving differential equations.

TEXT BOOKS :

Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015. [For Units I & III - Sections 1.1, 2.2, 2.3, 2.5, 2.7(Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1(Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :

Anton, H, Bivens, I and Davis, S, "Calculus", Wiley, 10th Edition, 2016.

Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.

3. **Narayanan, S. and Manicavachagom Pillai, T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.**

Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.

Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016.

PH8151	ENGINEERING PHYSICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I PROPERTIES OF MATTER 9

Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT II WAVES AND FIBER OPTICS 9

Oscillatory motion – forced and damped oscillations: differential equation and its solution – plane progressive waves – wave equation. Lasers : population of energy levels, Einstein's A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – losses associated with optical fibers - fibre optic sensors: pressure and displacement.

UNIT III THERMAL PHYSICS 9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conduction, convection and radiation – heat conductions in solids – thermal conductivity - Forbe's and Lee's disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT IV QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunnelling (qualitative) - scanning tunnelling microscope.

UNIT V CRYSTAL PHYSICS 9

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults – role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course,

the students will gain knowledge on the basics of properties of matter and its applications,

the students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,

the students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,

the students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and

the students will understand the basics of crystals, their structures and different crystal growth techniques.

TEXT BOOKS:

Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.

Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.

Pandey, B.K. & Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012.

REFERENCES:

Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.

Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning, 2010.

Tipler, P.A. & Mosca, G. "Physics for Scientists and Engineers with Modern Physics'. W.H.Freeman, 2007.

CY8151 ENGINEERING CHEMISTRY LTPC

3 003

OBJECTIVES:

To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.

To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.

Preparation, properties and applications of engineering materials.

Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT I WATER AND ITS TREATMENT 9

Hardness of water – types – expression of hardness – units – estimation of hardness of water by EDTA – numerical problems – boiler troubles (scale and sludge) – treatment of boiler feed water – Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) external treatment

– Ion exchange process, zeolite process – desalination of brackish water - Reverse Osmosis.

UNIT II SURFACE CHEMISTRY AND CATALYSIS 9

Adsorption: Types of adsorption – adsorption of gases on solids – adsorption of solute from solutions – adsorption isotherms – Freundlich's adsorption isotherm – Langmuir's adsorption isotherm – contact theory – kinetics of surface reactions, unimolecular reactions, Langmuir - applications of adsorption on pollution abatement.

Catalysis: Catalyst – types of catalysis – criteria – autocatalysis – catalytic poisoning and catalytic promoters - acid base catalysis – applications (catalytic convertor) – enzyme catalysis– Michaelis – Menten equation.

UNIT III ALLOYS AND PHASE RULE 9

Alloys: Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Nichrome and stainless steel (18/8) – heat treatment of steel. Phase rule: Introduction, definition of terms with examples, one component system -water system - reduced phase rule - thermal analysis and cooling curves - two component systems - lead-silver system - Pattinson process.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - manufacture of synthetic petrol (Bergius process) - knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - power alcohol and biodiesel. Combustion of fuels: Introduction - calorific value - higher and lower calorific values- theoretical calculation of calorific value - ignition temperature - spontaneous ignition temperature - explosive range - flue gas analysis (ORSAT Method).

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant - breeder reactor -

solar energy conversion - solar cells - wind energy. Batteries, fuel cells and supercapacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells – H_2-O_2 fuel cell.

TOTAL: 45 PERIODS

OUTCOMES:

The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015

P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015

S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD, New Delhi, 2013.

REFERENCES:

Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.

Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015.

Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2015.

GE8151 PROBLEM SOLVING AND PYTHON PROGRAMMING L T P C

3 0 0 3

COURSE OBJECTIVES:

To know the basics of algorithmic problem solving

To read and write simple Python programs.

To develop Python programs with conditionals and loops. To define Python functions and call them.

To use Python data structures –- lists, tuples, dictionaries. To do input/output with files in Python.

UNIT I ALGORITHMIC PROBLEM SOLVING 9

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

COURSE OUTCOMES:

Upon completion of the course, students will be able to

- **Develop algorithmic solutions to simple computational problems**
- **Read, write, execute by hand simple Python programs.**
- **Structure simple Python programs for solving problems.**
- **Decompose a Python program into functions.**
- **Represent compound data using Python lists, tuples, dictionaries.**
- **Read and write data from/to files in Python Programs.**

TOTAL : 45 PERIODS

TEXT BOOKS:

1. **Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)**
2. **Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.**
3. **Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.**
4. **John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013**
5. **Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.**
6. **Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC, 2013.**
7. **Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.**
8. **Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.**

GE8152 ENGINEERING GRAPHICS LTPC

2 0 4 4

OBJECTIVES:

To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.

T o expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination) 1

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING 7+12

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 5+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 5+12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12 Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method .

TOTAL: 90 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

familiarize with the fundamentals and standards of Engineering graphics

perform freehand sketching of basic geometrical constructions and multiple views of objects. project orthographic projections of lines and plane surfaces.

draw projections and solids and development of surfaces.

visualize and to project isometric and perspective sections of simple solids.

TEXT BOOK:

Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

REFERENCES:

Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.

Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.

Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

N S Parthasarathy And Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.

Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.

Publication of Bureau of Indian Standards:

IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.

IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.

IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.

IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.

IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

There will be five questions, each of either or type covering all units of the syllabus.

All questions will carry equal marks of 20 each making a total of 100.

The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.

The examination will be conducted in appropriate sessions on the same day

GE8161	**PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY**	**LTPC 004 2**

COURSE OBJECTIVES:

To write, test, and debug simple Python programs.

To implement Python programs with conditionals and loops. Use functions for structuring Python programs. Represent compound data using Python lists, tuples, dictionaries. Read and write data from/to files in Python.

LIST OF PROGRAMS

- **Compute the GCD of two numbers.**
- **Find the square root of a number (Newton's method)**
- **Exponentiation (power of a number)**
- **Find the maximum of a list of numbers**
- **Linear search and Binary search**
- **Selection sort, Insertion sort**
- **Merge sort**
- **First n prime numbers**
- **Multiply matrices**
- **Programs that take command line arguments (word count)**
- **Find the most frequent words in a text read from a file**
- **Simulate elliptical orbits in Pygame**
- **Simulate bouncing ball using Pygame**

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

COURSE OUTCOMES:

Upon completion of the course, students will be able to

- **Write, test, and debug simple Python programs.**
- **Implement Python programs with conditionals and loops.**
  - **Develop Python programs step-wise by defining functions and calling them.**
  - **Use Python lists, tuples, dictionaries for representing compound data.**
- **Read and write data from/to files in Python.**

TOTAL :60 PERIODS

BS8161	**PHYSICS AND CHEMISTRY LABORATORY**	**L T**	**P**	**C**
	(Common to all branches of B.E. / B.Tech Programmes)	**0 0**	**4**	**2**

OBJECTIVES:

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

- **Determination of rigidity modulus – Torsion pendulum**
- **Determination of Young's modulus by non-uniform bending method**
- **(a) Determination of wavelength, and particle size using Laser**
  (b) Determination of acceptance angle in an optical fiber.
- **Determination of thermal conductivity of a bad conductor – Lee's Disc method.**
- **Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer**
- **Determination of wavelength of mercury spectrum – spectrometer grating**
- **Determination of band gap of a semiconductor**
- **Determination of thickness of a thin wire – Air wedge method**

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

apply principles of elasticity, optics and thermal properties for engineering applications.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:

To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

To acquaint the students with the determination of molecular weight of a polymer by viscometery.

Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.

Determination of total, temporary & permanent hardness of water by EDTA method.

Determination of DO content of water sample by Winkler's method.

Determination of chloride content of water sample by argentometric method.

Estimation of copper content of the given solution by Iodometry.

Determination of strength of given hydrochloric acid using pH meter.

Determination of strength of acids in a mixture of acids using conductivity meter.

Estimation of iron content of the given solution using potentiometer.

Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).

Estimation of sodium and potassium present in water using flame photometer.

Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

Pseudo first order kinetics-ester hydrolysis.

Corrosion experiment-weight loss method.

Determination of CMC.

Phase change in a solid.

Conductometric titration of strong acid vs strong base.

OUTCOMES:

The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

TOTAL: 30 PERIODS

TEXTBOOKS:

1. **Vogel's Textbook of Quantitative Chemical Analysis (8^{TH} edition, 2014)**

HS8251	TECHNICAL ENGLISH	L	T	P	C
		4	0	0	4

OBJECTIVES: The Course prepares second semester engineering and Technology students to:

- **Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.**
- **Foster their ability to write convincing job applications and effective reports.**
- **Develop their speaking skills to make technical presentations , participate in group discussions.**
- **Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialisation.**

UNIT I INTRODUCTION TECHNICAL ENGLISH 12

Listening- Listening to talks mostly of a scientific/technical nature and completing information-gap exercises- Speaking –Asking for and giving directions- Reading – reading short technical texts from journals- newsapapers- Writing- purpose statements – extended definitions – issue- writing instructions – checklists-recommendations-Vocabulary Development- technical vocabulary Language Development –subject verb agreement - compound words.

UNIT II READING AND STUDY SKILLS 12

Listening- Listening to longer technical talks and completing exercises based on them- Speaking – describing a process-Reading – reading longer technical texts- identifying the various transitions in a text- paragraphing- Writing- interpreting cgarts, graphs- Vocabulary Development-vocabularyused in formal letters/emails and reports Language Development- impersonal passive voice, numerical adjectives.

UNIT III TECHNICAL WRITING AND GRAMMAR 12

Listening- Listening to classroom lectures/ talkls on engineering/technology -Speaking – introduction to technical presentations- Reading – longer texts both general and technical, practice in speed reading; Writing-Describing a process, use of sequence words- Vocabulary Development- sequence words- Misspelled words. Language Development- embedded sentences

UNIT IV REPORT WRITING 12

Listening- Listening to documentaries and making notes. Speaking – mechanics of presentations-Reading – reading for detailed comprehension- Writing- email etiquette- job application – cover letter –Résumé preparation(via email and hard copy)- analytical essays and issue based essays-- Vocabulary Development- finding suitable synonyms-paraphrasing-. Language Development-clauses- if conditionals.

UNIT V GROUP DISCUSSION AND JOB APPLICATIONS 12

Listening- TED/Ink talks; Speaking –participating in a group discussion -Reading– reading and understanding technical articles Writing– Writing reports- minutes of a meeting- accident and survey-Vocabulary Development- verbal analogies Language Development- reported speech.

TOTAL : 60 PERIODS

OUTCOMES: At the end of the course learners will be able to:

Read technical texts and write area- specific texts effortlessly.

Listen and comprehend lectures and talks in their area of specialisation successfully.

Speak appropriately and effectively in varied formal and informal contexts.

Write reports and winning job applications.

TEXT BOOKS:

Board of editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016.

Sudharshana.N.P and Saveetha. C. English for Technical Communication. Cambridge University Press: New Delhi, 2016.

REFERENCES

Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.

Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007

Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015

Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007

Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice.Oxford University Press: New Delhi,2014.

Students can be asked to read Tagore, Chetan Bhagat and for suplementary reading.

MA8251	ENGINEERING MATHEMATICS – II	L	T	P	C
		4	0	0	4

OBJECTIVES :

This course is designed to cover topics such as Matrix Algebra, Vector Calculus, Complex Analysis and Laplace Transform. Matrix Algebra is one of the powerful tools to handle practical problems arising in the field of engineering. Vector calculus can be widely used for modelling the various laws of physics. The various methods of complex analysis and Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT I MATRICES 12

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II VECTOR CALCULUS 12 Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and
Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTIONS **12**

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions w z c, cz, $\frac{1}{z}$, z^2 - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION **12**

Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour.

UNIT V LAPLACE TRANSFORMS 12 Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

TOTAL: 60 PERIODS

OUTCOMES :

After successfully completing the course, the student will have a good understanding of the following topics and their applications:

Eigenvalues and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.

Gradient, divergence and curl of a vector point function and related identities.

Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.

Analytic functions, conformal mapping and complex integration.

Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

TEXT BOOKS :

1. **Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.**
2. **Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2016.**

REFERENCES :

Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.

Jain R.K. and Iyengar S.R.K., " Advanced Engineering Mathematics ", Narosa Publications, New Delhi , 3ru Edition, 2007.

3. **O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.**
4. **Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.**

Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

PH8253	PHYSICS FOR ELECTRONICS ENGINEERING	L	T	P	C
	(Common to BME, ME, CC, ECE, EEE, E&I, ICE)	3	0	0	3

OBJECTIVES:

To understand the essential principles of Physics of semiconductor device and Electron transport properties. Become proficient in magnetic, dielectric and optical properties of materials and nano devices.

UNIT I ELECTRICAL PROPERTIES OF MATERIALS 9 Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann -Franz law – Success and failures - electrons in metals – Particle in a three dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential: Bloch thorem – metals and insulators - Energy bands in solids– tight binding approximation - Electron effective mass – concept of hole.

UNIT II SEMICONDUCTOR PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Carrier transport: Velocity-electric field relations – drift and diffusion transport - Einstein's relation – Hall effect and devices – Zener and avalanche breakdown in p-n junctions - Ohmic contacts – tunnel diode - Schottky diode – MOS capacitor - power transistor.

UNIT III MAGNETIC AND DIELECTRIC PROPERTIES OF MATERIALS 9

Magnetism in materials – magnetic field and induction – magnetization - magnetic permeability and susceptibility–types of magnetic materials – microscopic classification of magnetic materials - Ferromagnetism: origin and exchange interaction- saturation magnetization and Curie temperature – Domain Theory. Dielectric materials: Polarization processes – dielectric loss – internal field – Clausius-Mosotti relation- dielectric breakdown – high-k dielectrics.

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and Semiconductors (concepts only) - photo current in a P- N diode – solar cell –photo detectors - LED – Organic LED – Laser diodes – excitons - quantum confined Stark effect – quantum dot laser.

UNIT V NANOELECTRONIC DEVICES 9

Introduction - electron density in bulk material – Size dependence of Fermi energy– quantum confinement – quantum structures - Density of states in quantum well, quantum wire and quantum dot structures –Zener-Bloch oscillations – resonant tunneling – quantum interference effects – mesoscopic structures: conductance fluctuations and coherent transport – Coulomb blockade effects - Single electron phenomena and Single electron Transistor – magnetic semiconductors– spintronics - Carbon nanotubes: Properties and applications.

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, the students will able to

gain knowledge on classical and quantum electron theories, and energy band structuues,

acquire knowledge on basics of semiconductor physics and its applications in various devices, get knowledge on magnetic and dielectric properties of materials,

have the necessary understanding on the functioning of optical materials for optoelectronics,

understand the basics of quantum structures and their applications in spintronics and carbon electronics..

TEXT BOOKS:

Kasap, S.O. "Principles of Electronic Materials and Devices", McGraw-Hill Education, 2007.

Umesh K Mishra & Jasprit Singh, "Semiconductor Device Physics and Design", Springer, 2008.

Wahab, M.A. "Solid State Physics: Structure and Properties of Materials". Narosa Publishing House, 2009.

REFERENCES

Garcia, N. & Damask, A. "Physics for Computer Science Students". Springer-Verlag, 2012.

Hanson, G.W. "Fundamentals of Nanoelectronics". Pearson Education, 2009

Rogers, B., Adams, J. & Pennathur, S. "Nanotechnology: Understanding Small Systems". CRC Press, 2014

BE8252 BASIC CIVIL AND MECHANICAL ENGINEERING LT PC
4 0 0 4

OBJECTIVES:

To impart basic knowledge on Civil and Mechanical Engineering.

To familiarize the materials and measurements used in Civil Engineering.

To provide the exposure on the fundamental elements of civil engineering structures.

To enable the students to distinguish the components and working principle of power plant units, IC engines, and R & AC system.

A – OVER VIEW

UNIT I SCOPE OF CIVIL AND MECHANICAL ENGINEERING 10

Overview of Civil Engineering - Civil Engineering contributions to the welfare of Society – Specialized sub disciplines in Civil Engineering – Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering

Overview of Mechanical Engineering - Mechanical Engineering contributions to the welfare of Society –Specialized sub disciplines in Mechanical Engineering - Production, Automobile, Energy Engineering - Interdisciplinary concepts in Civil and Mechanical Engineering.

B – CIVIL ENGINEERING

UNIT II SURVEYING AND CIVIL ENGINEERING MATERIALS 10

Surveying: Objects – classification – principles – measurements of distances – angles – leveling – determination of areas– contours - examples.

Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel - timber - modern materials

UNIT III BUILDING COMPONENTS AND STRUCTURES 15

Foundations: Types of foundations - Bearing capacity and settlement – Requirement of good foundations.

Civil Engineering Structures: Brickmasonry – stonemasonry – beams – columns – lintels – roofing – flooring – plastering – floor area, carpet area and floor space index - Types of Bridges and Dams – water supply - sources and quality of water - Rain water harvesting - introduction to high way and rail way.

C – MECHANICAL ENGINEERING

UNIT IV INTERNAL COMBUSTION ENGINES AND POWER PLANTS 15

Classification of Power Plants - Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Working principle of steam, Gas, Diesel, Hydro - electric and Nuclear Power plants –- working principle of Boilers, Turbines, Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 10

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system–Layout of typical domestic refrigerator–Window and Split type room Air conditioner.

OUTCOMES:

On successful completion of this course, the student will be able to

- **appreciate the Civil and Mechanical Engineering components of Projects.**
- **explain the usage of construction material and proper selection of construction materials. measure distances and area by surveying**
- **identify the components used in power plant cycle.**
- **demonstrate working principles of petrol and diesel engine.**
- **elaborate the components of refrigeration and Air conditioning cycle.**

TOTAL: 60 PERIODS

TEXTBOOKS:

Shanmugam Gand Palanichamy MS,"Basic Civil and Mechanical Engineering",Tata McGraw Hill PublishingCo.,NewDelhi,1996.

REFERENCES:

Palanikumar, K. Basic Mechanical Engineering, ARS Publications, 2010.

Ramamrutham S.,"Basic Civil Engineering", Dhanpat Rai Publishing Co.(P) Ltd.1999.

Seetharaman S.,"BasicCivil Engineering",AnuradhaAgencies,2005.

ShanthaKumar SRJ.,"Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, 2000.

Venugopal K. and Prahu Raja V., "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam,2000.

EE8251 CIRCUIT THEORY L T P C 2203

OBJECTIVES:

- **To introduce electric circuits and its analysis**
- **To impart knowledge on solving circuit equations using network theorems**
- **To introduce the phenomenon of resonance in coupled circuits.**
- **To educate on obtaining the transient response of circuits.**
- **To introduce Phasor diagrams and analysis of three phase circuits**

UNIT I BASIC CIRCUITS ANALYSIS 6+6

Resistive elements - Ohm's Law Resistors in series and parallel circuits – Kirchoffs laws – Mesh current and node voltage - methods of analysis.

UNIT II NETWORK REDUCTION AND THEOREMS FOR DC AND AC IRCUITS 6+6

Network reduction: voltage and current division, source transformation – star delta conversion. Thevenins and Norton Theorems – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem – Millman's theorem.

UNIT III TRANSIENT RESPONSE ANALYSIS 6+6

L and C elements -Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. sinusoidal input.

UNIT IV THREE PHASE CIRCUITS 6+6

A.C. circuits – Average and RMS value - Phasor Diagram – Power, Power Factor and Energy.- Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power measurement in three phase circuits.

UNIT V RESONANCE AND COUPLED CIRCUITS 6+6

Series and parallel resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

TOTAL : 60 PERIODS

OUTCOMES:

- **Ability to analyse electrical circuits**
- **Ability to apply circuit theorems**
- **Ability to analyse transients**

TEXT BOOKS:

- **William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill publishers, edition, New Delhi, 2013.**
- **Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2013.**
- **Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning India, 2013.**

REFERENCES

- **Chakrabarti A, "Circuits Theory (Analysis and synthesis), Dhanpath Rai & Sons, New Delhi, 1999.**
- **Jegatheesan, R., "Analysis of Electric Circuits," McGraw Hill, 2015.**

Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series, McGraw-Hill, New Delhi, 2010.
M E Van Valkenburg, "Network Analysis",Prentice-Hall of India Pvt Ltd, New Delhi, 2015.
Mahadevan, K., Chitra, C., "Electric Circuits Analysis," Prentice-Hall of India Pvt Ltd., New Delhi, 2015.
Richard C. Dorf and James A. Svoboda, "Introduction to Electric Circuits", 7th Edition, John Wiley & Sons, Inc. 2015.
Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", McGraw Hill, 2015.

GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING LTPC
3 003

OBJECTIVES:

To study the nature and facts about environment.
To finding and implementing scientific, technological, economic and political solutions to environmental problems.
To study the interrelationship between living organism and environment.
To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
To study the dynamic processes and understand the features of the earth"s interior and surface.
To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

Public awareness of environmental is at infant stage.

Ignorance and incomplete knowledge has lead to misconceptions

Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS:

Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.

Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCES :

Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD,New Delhi, 2007.

Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) PVT, LTD, Hydrabad, 2015.

G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.

Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.

GE8261 ENGINEERING PRACTICES LABORATORY LTPC
0042

OBJECTIVES:

To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE 13

Buildings:

Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
Study of pipe connections requirements for pumps and turbines.
Preparation of plumbing line sketches for water supply and sewage works.
Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

Study of the joints in roofs, doors, windows and furniture.
Hands-on-exercise:
Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE 18

Welding:

Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
Gas welding practice

Simple Turning and Taper turning
Drilling Practice

Sheet Metal Work:

Forming & Bending:
Model making – Trays and funnels.
Different type of joints.

Machine assembly practice:

Study of centrifugal pump
Study of air conditioner

Demonstration on:

Smithy operations, upsetting, swaging, setting down and bending.
Example – Exercise – Production of hexagonal headed bolt.
Foundry operations like mould preparation for gear and step cone pulley.
Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 13

Residential house wiring using switches, fuse, indicator, lamp and energy meter.
Fluorescent lamp wiring.
Stair case wiring
Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
Measurement of energy using single phase energy meter.
Measurement of resistance to earth of an electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE 16

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak- peak, rms period, frequency) using CR.
Study of logic gates AND, OR, EX-OR and NOT.
Generation of Clock Signal.
Soldering practice – Components Devices and Circuits – Using general purpose PCB.
Measurement of ripple factor of HWR and FWR.

TOTAL: 60 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

fabricate carpentry components and pipe connections including plumbing works. use welding equipments to join the structures.
Carry out the basic machining operations
Make the models using sheet metal works
Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings
Carry out basic home electrical works and appliances Measure the electrical quantities
Elaborate on the components, gates, soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	**15 Sets.**
2. Carpentry vice (fitted to work bench)	**15 Nos.**
3. Standard woodworking tools	**15 Sets.**
4. Models of industrial trusses, door joints, furniture joints	**5 each**
5. Power Tools: (a) Rotary Hammer	**2 Nos**
(b) Demolition Hammer	**2 Nos**
(c) Circular Saw	**2 Nos**
(d) Planer	**2 Nos**
(e) Hand Drilling Machine	**2 Nos**
(f) Jigsaw	**2 Nos**

MECHANICAL

1. Arc welding transformer with cables and holders	5 Nos.
2. Welding booth with exhaust facility	5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos.
5. Centre lathe	2 Nos.
6. Hearth furnace, anvil and smithy tools	2 Sets.
7. Moulding table, foundry tools	2 Sets.
8. Power Tool: Angle Grinder	2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner	One each.

ELECTRICAL

1. Assorted electrical components for house wiring	15 Sets
2. Electrical measuring instruments	10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp	1 each
4. Megger (250V/500V)	1No.
5. Power Tools: (a) Range Finder	2Nos
(b) Digital Live-wire detector	2Nos

ELECTRONICS

1. Soldering guns	10Nos.
2. Assorted electronic components for making circuits	50Nos.
3. Small PCBs	10Nos.
4. Multimeters	10Nos.
Study purpose items: Telephone, FM radio, low-voltage power supply	

EE8261 ELECTRIC CIRCUITS LABORATORY

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OBJECTIVES:

To simulate various electric circuits using Pspice/ Matlab/e-Sim / Scilab

To gain practical experience on electric circuits and verification of theorems.

LIST OF EXPERIMENTS

Simulation and experimental solving of electrical circuit problems using Kirchhoff's voltage and current laws.

2. Simulation and experimental solving of electrical circuit problems using Thevenin's theorem.
3. Simulation and experimental solving of electrical circuit problems using Norton's theorem.
4. Simulation and experimental solving of electrical circuit problems using Superposition theorem.

Simulation and experimental verification of Maximum Power transfer Theorem.

Study of Analog and digital oscilloscopes and measurement of sinusoidal voltage, frequency and power factor.
Simulation and Experimental validation of R-C electric circuit transience.
Simulation and Experimental validation of frequency response of RLC electric circuit.
Design and Simulation of series resonance circuit.
Design and Simulation of parallel resonant circuits.
Simulation of three phase balanced and unbalanced star, delta networks circuits.

TOTAL: 60 PERIODS

OUTCOMES:

Understand and apply circuit theorems and concepts in engineering applications. Simulate electric circuits.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Regulated Power Supply: 0 – 15 V D.C - 10 Nos / Distributed Power Source.
Function Generator (1 MHz) - 10 Nos.
Single Phase Energy Meter - 1 No.

Digital Storage Oscilloscope (20 MHz) – 1 No.
10 Nos of PC with Circuit Simulation Software (min 10 Users) (e-Sim / Scilab/ Pspice / Matlab /other Equivalent software Package) and Printer (1 No.)
AC/DC - Voltmeters (10 Nos.), Ammeters (10 Nos.) and Multi-meters (10 Nos.) 8
Single Phase Wattmeter – 3 Nos.
Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box Each - 6 Nos.
Circuit Connection Boards - 10 Nos.

Necessary Quantities of Resistors, Inductors, Capacitors of various capacities (Quarter Watt to 10 Watt)

MA8353TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	**L**	**T**	**P**	**C**
	4	**0**	**0**	**4**

OBJECTIVES :

To introduce the basic concepts of PDE for solving standard partial differential equations.
To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
To acquaint the student with Fourier transform techniques used in wide variety of situations.
To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations – Singular integrals - Solutions of standard types of first order partial differential equations - Lagrange's linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT II FOURIER SERIES 12

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier series – Parseval's identity – Harmonic analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 12

Classification of PDE – Method of separation of variables - Fourier Series Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT IV FOURIER TRANSFORMS 12

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 12

Z-transforms - Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL : 60 PERIODS

OUTCOMES :

Upon successful completion of the course, students should be able to:

Understand how to solve the given standard partial differential equations.

Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.

Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.

Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

Use the effective mathematical tools for the solutions of partial differential equations by using

Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.

Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.

REFERENCES :

Andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SPIE Press, 1999.

Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Edition, Laxmi Publications Pvt. Ltd, 2014.

Erwin Kreyszig, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, India, 2016.

James, G., "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.

Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

EC8353 ELECTRON DEVICES AND CIRCUITS L T P C

3 0 0 3

OBJECTIVES:

The student should be made to:

- **Understand the structure of basic electronic devices.**
- **Be exposed to active and passive circuit elements.**
- **Familiarize the operation and applications of transistor like BJT and FET.**
- **Explore the characteristics of amplifier gain and frequency response.**
- **Learn the required functionality of positive and negative feedback systems.**

UNIT I PN JUNCTION DEVICES 9

PN junction diode –structure, operation and V-I characteristics, diffusion and transition capacitance - Rectifiers – Half Wave and Full Wave Rectifier,– Display devices- LED, Laser diodes, Zener diodecharacteristics- Zener Reverse characteristics – Zener as regulator

UNIT II TRANSISTORS AND THYRISTORS 9

BJT, JFET, MOSFET- structure, operation, characteristics and Biasing UJT, Thyristors and IGBT - Structure and characteristics.

UNIT III AMPLIFIERS 9

BJT small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response – MOSFET small signal model– Analysis of CS and Source follower – Gain and frequency response-High frequency analysis.

UNIT IV MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER 9

BIMOS cascade amplifier, Differential amplifier – Common mode and Difference mode analysis – FET input stages – Single tuned amplifiers – Gain and frequency response – Neutralization methods, power amplifiers –Types (Qualitative analysis).

UNIT V FEEDBACK AMPLIFIERS AND OSCILLATORS 9

Advantages of negative feedback – voltage / current, series , Shunt feedback –positive feedback – Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.

TOTAL : 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- **Explain the structure and working operation of basic electronic devices.**
- **Able to identify and differentiate both active and passive elements**
- **Analyze the characteristics of different electronic devices such as diodes and transistors**
- **Choose and adapt the required components to construct an amplifier circuit.**
- **Employ the acquired knowledge in design and analysis of oscillators**

TEXT BOOKS:

1. . David A. Bell ,''Electronic devices and circuits", Oxford University higher education, 5th edition 2008.

2. Sedra and smith, "Microelectronic circuits",7th Ed., Oxford University

Press REFERENCES:

Balbir Kumar, Shail.B.Jain, "Electronic devices and circuits" PHI learning private limited, 2nd edition 2014.

Thomas L.Floyd, "Electronic devices" Conventional current version, Pearson prentice hall, 10th Edition, 2017.

Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGraw Hill, 3rd Edition, 2003.

Robert L.Boylestad, "Electronic devices and circuit theory", 2002.

Robert B. Northrop, "Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation", CRC Press, 2004.

EE8351 DIGITAL LOGIC CIRCUITS L T P C 2203

OBJECTIVES:

To study various number systems and simplify the logical expressions using Boolean functions

To study combinational circuits

To design various synchronous and asynchronous circuits.

To introduce asynchronous sequential circuits and PLDs

To introduce digital simulation for development of application oriented logic circuits.

UNIT I NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES 6+6

Review of number systems, binary codes, error detection and correction codes (Parity and Hamming code) - Digital Logic Families - comparison of RTL, DTL, TTL, ECL and MOS families -operation, characteristics of digital logic family.

UNIT II COMBINATIONAL CIRCUITS 6+6

Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps - simplification and implementation of combinational logic – multiplexers and de multiplexers - code converters, adders, subtractors, Encoders and Decoders.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 6+6

Sequential logic- SR, JK, D and T flip flops - level triggering and edge triggering - counters - asynchronous and synchronous type - Modulo counters - Shift registers - design of synchronous sequential circuits – Moore and Melay models- Counters, state diagram; state reduction; state assignment.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS AND PROGRAMMABILITY LOGIC DEVICES 6+6

Asynchronous sequential logic circuits-Transition tability, flow tability-race conditions, hazards &errors in digital circuits; analysis of asynchronous sequential logic circuits-

introduction to Programmability Logic Devices: PROM – PLA –PAL, CPLD-FPGA.

UNIT V VHDL 6+6

RTL Design – combinational logic – Sequential circuit – Operators – Introduction to Packages – Subprograms – Test bench. (Simulation /Tutorial Examples: adders, counters, flip flops, Multiplexers & De multiplexers).

TOTAL : 60 PERIODS

OUTCOMES:

Ability to design combinational and sequential
Circuits. Ability to simulate using software package.
Ability to study various number systems and simplify the logical expressions using Boolean functions
Ability to design various synchronous and asynchronous circuits.
Ability to introduce asynchronous sequential circuits and PLDs
Ability to introduce digital simulation for development of application oriented logic circuits.

TEXT BOOKS:

James W. Bignel, Digital Electronics, Cengage learning, 5th Edition, 2007.
M. Morris Mano, 'Digital Design with an introduction to the VHDL', Pearson Education, 2013.
Comer "Digital Logic & State Machine Design, Oxford, 2012.

REFERENCES

Mandal, "Digital Electronics Principles & Application, McGraw Hill Edu, 2013.
William Keitz, Digital Electronics-A Practical Approach with VHDL, Pearson, 2013.
Thomas L.Floyd, 'Digital Fundamentals', 11th edition, Pearson Education, 2015.
Charles H.Roth, Jr, Lizy Lizy Kurian John, 'Digital System Design using VHDL, Cengage, 2013.
D.P.Kothari,J.S.Dhillon, 'Digital circuits and Design',Pearson Education, 2016.

EI8351 ELECTRICAL MEASUREMENTS LTPC
2 2 0 3

OBJECTIVES:

To introduce the meters used to measure current & voltage.
To have an adequate knowledge in the measurement techniques for power and energy, power and energy meters are included.
To provide Elaborate discussion about potentiometer & instrument transformers. To provide Detailed study of resistance measuring methods.
To provide Detailed study of inductance and capacitance measurement.

UNIT I MEASUREMENT OF VOLTAGE AND CURRENT 6+6

Galvanometers: – Ballistic, D'Arsonval galvanometer – Theory, calibration, application – Principle, construction, operation and comparison of moving coil, moving iron meters, dynamometer, induction type & thermal type meter, rectifier type – Extension of range and calibration of voltmeter and ammeter – Errors and compensation.

UNIT II MEASUREMENT OF POWER AND ENERGY 6+6

Electrodynamometer type wattmeter: – Theory & its errors – Methods of correction – LPF wattmeter– Phantom loading – Induction type kWh meter – Induction type energy meter – Calibration of wattmeter and Energy meter.

UNIT III POTENTIOMETERS & INSTRUMENT TRANSFORMERS 6+6

DC potentiometer:– Basic circuit, standardization – Laboratory type (Crompton's) – AC potentiometer:- Drysdale (polar type) type – Gall-Tinsley (coordinate) type – Limitations & applications – Instrument Transformer:-C.T and P.T construction, theory, operation and characteristics.

UNIT IV RESISTANCE MEASUREMENT 6+6

Measurement of low, medium & high resistance: – Ammeter, voltmeter method – Wheatstone bridge– Kelvin double bridge – Series and shunt type ohmmeter – High resistance measurement :- Loss of charge method, Megohm bridge method –Megger – Direct deflection methods – Price's guard-wiremethod – Earth resistance measurement.

UNIT V IMPEDANCE MEASUREMENT 6+6

A.C bridges:– Measurement of inductance, capacitance – Q of coil – Maxwell Bridge – Wein's bridge– Schering bridge – Anderson bridge –Hay's bridge- Campbell bridge to measure mutual inductance – Errors in A.C. bridge methods and their compensation – Detectors – Excited field – A.C. galvanometer– Vibration galvanometer.

TOTAL:60 PERIODS

COURSE OUTCOMES

At the end of the course, the student should have the:

- **Ability to measure current and voltage,**
- **Ability to understand AC and DC measurements.**
- **Ability to measure power and calibration of energy meters.**
- **Ability to measure current and voltage using potentiometric method.**
- **Ability to understand the resistance measurement**
- **Ability to use bridge circuit to measure resistance, inductance and capacitance.**

TEXT BOOKS

- **E.W. Golding &F.C.Widdis, 'Electrical Measurements & Measuring Instruments', A.H.Wheeler& Co, 2001**
- **H.S. Kalsi, Electronic Instrumentation, McGraw-Hill Education, New Delhi, 2010**

REFERENCES

- **A.K. Sawhney, A Course in Electrical & Electronic Measurements & Instrumentation, Dhanpat Rai and Co, New Delhi, 2010.**
- **S.K.Singh, 'Industrial Instrumentation and control', Tata McGraw Hill, 2nd edn., 2002.**
- **J.B.Gupta, 'A Course in Electronic and Electrical Measurements and Instrumentation',S.K.Kataria& Sons, Delhi, 2003.**
- **Martin U. Reissland, 'Electrical Measurement – Fundamental Concepts and Applications', New Age International (P) Ltd., 2001.**
- **R.B. Northrop, Introduction to Instrumentation and Measurements, Taylor & Francis, New Delhi, 2008.**
- **M.M.S. Anand, "Electronics Instruments and Instrumentation Technology", Prentice Hall India, NewDelhi, 2009.**
- **J.J. Carr, "Elements of Electronic Instrumentation and Measurement", Pearson Education India, New Delhi, 2011.**

EI8352 TRANSDUCERS ENGINEERING LTPC

300 3

COURSE OBJECTIVES

- **Get to know the methods of measurement, classification of transducers and to analyze error.**
- **To understand the behavior of transducers under static and dynamic conditions and hence to model the transducer.**
- **Get exposed to different types of resistive transducers and their application areas. To acquire knowledge on capacitive and inductive transducers.**
- **To gain knowledge on variety of transducers and get introduced to MEMS and Smart transducers.**

UNIT I SCIENCE OF MEASUREMENTS AND CLASSIFICATION OF TRANSDUCERS 9

Units and standards – Static calibration – Classification of errors, Limiting error and probable error – Error analysis – Statistical methods – Odds and uncertainty – Classification of transducers – Selection of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS 9

Static characteristics: - Accuracy, precision, resolution, sensitivity, linearity, span and range. Dynamic characteristics: Mathematical model of transducer, Zero, I and II order transducers, Response to impulse, step, ramp and sinusoidal inputs.

UNIT III VARIABLE RESISTANCE TRANSDUCERS 9

Principle of operation, construction details, characteristics and applications of potentiometer, strain gauge, resistance thermometer, Thermistor, hot-wire anemometer, piezo-resistive sensor and humidity sensor.

UNIT IV VARIABLE INDUCTANCE AND VARIABLE CAPACITANCE TRANSDUCERS 9

Inductive transducers: – Principle of operation, construction details, characteristics and applications of LVDT, Induction potentiometer – Variable reluctance transducers – Synchros – Microsyn – Principle of operation, construction details, characteristics of capacitive transducers – Different types & Signal Conditioning – Applications:- Capacitor microphone, Capacitive pressure sensor, Proximity sensor.

UNIT V OTHER TRANSDUCERS 9

Piezoelectric transducer – Hall Effect transducer – Magneto elastic sensor – Digital transducers – Fiber optic sensors – Thick & Thin Film sensors (Bio sensor & Chemical Sensor) – Environmental Monitoring sensors (Water Quality & Air pollution) – Introduction to MEMS – Introduction to Smart transducers and its interface standard (IEEE 1451).

TOTAL: 45 PERIODS

COURSE OUTCOMES

At the end of the course, the student should have the ability:

- **Ability to apply the mathematical knowledge and science & engineering fundamentals gained to solve problems pertaining to measurement applications.**

Ability to analyze the problems related to sensors & transducers.
Ability to select the right sensor/transducer for a given application.
Ability to determine the static and dynamic characteristics of transducers using software packages.
Ability to understand fiber optic sensor and applications.
Ability to understand smart traducer and its standard.

TEXT BOOKS

Doebelin E.O. and Manik D.N., "Measurement Systems", 6th Edition, McGraw-Hill Education Pvt. Ltd., 2011.
Neubert H.K.P., Instrument Transducers – An Introduction to their Performance and Design, Oxford University Press, Cambridge, 2003

Bela G.Liptak, Instrument Engineers' Handbook, Process Measurement and Analysis, 4th Edition, Vol. 1, ISA/CRC Press, 2003.
D. Patranabis, Sensors and Transducers, 2nd edition, Prentice Hall of India, 2010. E.A.
John P. Bentley, Principles of Measurement Systems, III Edition, Pearson Education, 2000.
W.Bolton, Engineering Science, Elsevier Newnes, Fifth edition, 2006.
Murthy, D.V.S., Transducers and Instrumentation, 2nd Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
Ian Sinclair, Sensors and Transducers, 3rd Edition, Elsevier, 2012.

CS8392 OBJECT ORIENTED PROGRAMMING LTPC
3 0 0 3

OBJECTIVES:

To understand Object Oriented Programming concepts and basic characteristics of Java To know the principles of packages, inheritance and interfaces
To define exceptions and use I/O streams
To develop a java application with threads and generics
classes To design and build simple Graphical User Interfaces

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 10

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment - Java Source File - Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages - JavaDoc comments.

UNIT II INHERITANCE AND INTERFACES 9

Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes, ArrayLists - Strings

UNIT III EXCEPTION HANDLING AND I/O 9

Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files.

UNIT IV MULTITHREADING AND GENERIC PROGRAMMING 8

Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

UNIT V EVENT DRIVEN PROGRAMMING 9

Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes - actions - mouse events - AWT event hierarchy - Introduction to Swing – layout management - Swing Components – Text Fields , Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

Develop Java programs using OOP principles

Develop Java programs with the concepts inheritance and interfaces Build Java applications using exceptions and I/O streams

Develop Java applications with threads and generics classes Develop interactive Java programs using swings

TEXT BOOKS

Herbert Schildt, "Java The complete reference", 8th Edition, McGraw Hill Education, 2011.

Cay S. Horstmann, Gary cornell, "Core Java Volume –I Fundamentals", 9th Edition, Prentice Hall, 2013.

REFERENCES

Paul Deitel, Harvey Deitel, "Java SE 8 for programmers", 3rd Edition, Pearson, 2015.

Steven Holzner, "Java 2 Black book", Dreamtech press, 2011.

Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.

EI8361 MEASUREMENTS AND TRANSDUCERS LABORATORY LTPC

0 0 4 2

COURSE OBJECTIVES

To make the students aware of basic concepts of measurement and operation of different types of transducers.

To make the students conscious about static and dynamic characteristics of different types of transducer.

To make the students to analyze step response of RTD

To the student to measure resistance using bridge circuits

To make the students to calibrate the electrical instruments

LIST OF EXPERIMENTS

Displacement versus output voltage characteristics of a potentiometric transducer.

Characteristics of Strain gauge and Load cell.

Characteristics of LVDT, Hall Effect transducer and Photoelectric tachometer.

Characteristics of LDR, thermistor and thermocouple (J, K, E types).

Step response characteristic of RTD and thermocouple.

Temperature measurements using RTD with three and four leads.

Wheatstone and Kelvin's bridge for measurement of resistance.

Schering Bridge for capacitance measurement and Anderson Bridge for inductance measurement.

Measurement of Angular displacement using resistive and Capacitive transducer.

Calibration of Single-phase Energy meter and wattmeter.

Calibration of Ammeter and Voltmeter using Shunt type potentiometer.

Minimum of ten experiments to be offered from the list. Additional one or two experiments can be framed beyond the list or curriculum

TOTAL : 60 PERIODS

COURSE OUTCOMES (COs)

Understand the concepts of measurement, error and uncertainty.
Understand the static and dynamic characteristics of measuring instruments.
Gain knowledge about the principle of operation and characteristics of different types of resistance, capacitance and inductance transducers.
Acquire knowledge of analyzing different stages of signal conditioning units.
Ability to interpret the results and draw meaningful conclusions.
Ability to work as a member of a team while carrying out experiments.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Experimental setup for
Measurement of Linear displacement using Potentiometer
Strain gauge and Load cell characterisation and application
LVDT characterisation and application
Hall Effect characterisation and application
Measurement of Angular displacement
Muffle furnace
Thermistor characterisation and application
Various types of Thermocouple and RTD characterisation and application Measurement of power and energy
Sufficient number of power supply, Galvanometer, Bread board, Multimeter, resistors, Decade Capacitance box, Decade resistance box, Decade Inductance box, CRO.

CS8383 OBJECT ORIENTED PROGRAMMING LABORATORY LTPC 0042

COURSE OBJECTIVES

To build software development skills using java programming for real-world applications.

To understand and apply the concepts of classes, packages, interfaces, arraylist, exception handling and file processing.

To develop applications using generic programming and event handling.

List of experiments

Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection(i.e domestic or commercial). Compute the bill amount using the following tariff.

If the type of the EB connection is domestic, calculate the amount to be paid as follows:

First 100 units - Rs. 1 per unit
101-200 units - Rs. 2.50 per unit
201 -500 units - Rs. 4 per unit
> 501 units - Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

First 100 units - Rs. 2 per unit
101-200 units - Rs. 4.50 per unit
201 -500 units - Rs. 6 per unit
> 501 units - Rs. 7 per unit

Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.

Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.

Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementations.

Write a program to perform string operations using ArrayList. Write functions for the following

Append - add at end
Insert – add at particular index
Search
List all string starts with given letter

Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

Write a Java program to implement user defined exception handling.

Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

Write a java program to find the maximum value from the given type of elements using a generic function.

Design a calculator using event-driven programming paradigm of Java with the following options.

Decimal manipulations

Scientific manipulations

Develop a mini project for any application using Java concepts.

TOTAL : 60 PERIODS

COURSE OUTCOMES

Upon completion of the course, the students will be able to

Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.

Develop and implement Java programs with arraylist, exception handling and multithreading .

Design applications using file processing, generic programming and event handling.

MA8491	NUMERICAL METHODS	L	T	P	C
		4	0	0	4

OBJECTIVES :

To introduce the basic concepts of solving algebraic and transcendental equations.

To introduce the numerical techniques of interpolation in various intervals in real life situations.

To acquaint the student with understanding of numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.

To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

To understand the knowledge of various techniques and methods of solving various types of partial differential equations.

UNIT ISOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT II INTERPOLATION AND APPROXIMATION 12

Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines - Difference operators and relations - Interpolation with equal intervals - Newton's forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 12

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's Method - Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single step methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge - Kutta method for solving first order equations - Multi step methods - Milne's and Adams - Bash forth predictor corrector methods for solving first order equations.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 12

Finite difference methods for solving second order two - point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method.

TOTAL : 60 PERIODS

OUTCOMES :

Upon successful completion of the course, students should be able to:

Understand the basic concepts and techniques of solving algebraic and transcendental equations.

Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations.

Apply the numerical techniques of differentiation and integration for engineering problems.

Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXTBOOKS :

Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.

Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

Brian Bradie, "A Friendly Introduction to Numerical Analysis", Pearson Education, Asia, New Delhi, 2007.

Gerald. C. F. and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 6th Edition, New Delhi, 2006.

Mathews, J.H. "Numerical Methods for Mathematics, Science and Engineering", 2nd Edition, Prentice Hall, 1992.

Sankara Rao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt. Ltd, 3rd Edition, New Delhi, 2007.

Sastry, S.S, "Introductory Methods of Numerical Analysis", PHI Learning Pvt. Ltd, 5th Edition, 2015.

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EI8451 ELECTRICAL MACHINES LTPC
3003

COURSE OBJECTIVES

To introduce the principles of operations of DC machines as motor and generator
To introduce the principles of operations of Transformers
To introduce the principles of operations of Induction machines
To introduce the principles of operations of Synchronous machines
To introduce other special machines

UNIT I D.C. MACHINES 9
D.C. Machines: – Principle of operation and construction of motor and generator – torque equation – Various excitation schemes – Characteristics of Motor and Generator – Starting, Speed control of D.C. Motor.

UNIT II TRANSFORMERS 9
Principle, Construction and Types of Transformer - EMF equation - Phasor diagrams - Regulation and efficiency of a transformer- Introduction to three phase transformer Connection. Applications of Current and Potential Transformer.

UNIT III SYNCHRONOUS MACHINES 9
Principle of Operation, type - EMF Equation and Phasor diagrams - Synchronous motor- Rotating Magnetic field Starting Methods , Torque V- Curves, inverted – V curves.

UNIT IV THREE PHASE INDUCTION MOTORS 9
Induction motor-principle of operation, Types - Torque-slip characteristics - Starting methods and Speed control of induction motors.

UNIT V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES 9
Types of single phase induction motors –Double field revolving theory- Capacitor start capacitor run motors – Shaded pole motor – Repulsion type motor – Universal motor – Hysteresis motor - Switched reluctance motor – Brushless D.C motor.-Stepper motor.
TOTAL: 45 PERIODS

COURSE OUTCOMES
At the end of the course, the student should have the:

- **Ability to acquire knowledge to solve problems associated with DC and AC Machines.**
- **Ability to test and control different machines based on the familiarity of basic concepts and working principle.**
- **Ability to choose appropriate machines for a given application while carrying out projects.**
- **Ability to apply the knowledge gained to choose appropriate machines for specific application useful for the society.**
- **Ability to know about the latest developments related to machines and to learn their concepts even after the completion of the course.**
- **Ability to acquire knowledge of stepper motor.**

TEXT BOOKS

Fitzgerald A.E, Kingsley C., Umans, S. and Umans S.D., "Electric Machinery", McGraw-Hill, 2002.

Theraja, B.L., "A Text book of Electrical Technology", Vol.II, S.C Chand and Co., New Delhi, 2007.

REFERENCES

Abhijit Chakrabarti and Sudipta Debnath, "Electrical Machines", McGraw-Hill Education, 2015.

Deshpande M. V., "Electrical Machines" PHI Learning Pvt. Ltd., New Delhi, 2011

B.S.Guru and H.R.Hiziroglu, "Electric Machinery and Transformer', Oxford university Press 2007

Del Toro, V., "Electrical Engineering Fundamentals", Prentice Hall of India, New Delhi, 1995.

Nagrath I. J and Kothari D. P. 'Electric Machines', Fourth Edition, McGraw Hill Education, 2010.

C.A.Gross, "Electric Machines", CRC Press 2010.

NPTEL Video Lecture series on "Electrical Machines I" and "Electrical Machines II" by Dr. Krishna Vasudevan, IIT Madras.

EI8452 INDUSTRIAL INSTRUMENTATION - I LTPC 3003

COURSE OBJECTIVES

To introduce the measurement techniques of force, torque and speed.

To introduce the measurement techniques of acceleration, Vibration and density

To introduce the measurement Viscosity, Humidity and moisture.

To introduce the temperature measurement techniques

To introduce the pressure measurement techniques

UNIT I MEASUREMENT OF FORCE, TORQUE AND SPEED 8

Different types of load cells: Hydraulic, Pneumatic, Strain gauge, Magneto-elastic and Piezoelectric load cells - Different methods of torque measurement: Strain gauge, Relative angular twist. Speed measurement: Capacitive tacho, Drag cup type tacho, D.C and A.C tacho generators - Stroboscope.

UNIT II MEASUREMENT OF ACCELERATION, VIBRATION AND DENSITY 8

Accelerometers: LVDT, Piezoelectric, Strain gauge and Variable reluctance type accelerometers - Mechanical type vibration instruments - Seismic instruments as accelerometer – Vibration sensor - Calibration of vibration pickups - Units of density and specific gravity – Baume scale and API scale – Densitometers: Pressure type densitometers, Float type densitometers, Ultrasonic densitometer and gas densitometer.

8

UNIT III MEASUREMENT OF VISCOSITY, HUMIDITY AND MOISTURE

Viscosity: Saybolt viscometer - Rotameter type and Torque type viscometers – Consistency Meters – Humidity: Dry and wet bulb psychrometers – Resistive and capacitive type hygrometers – Dew cell – Commercial type dew meter. Moisture: Different methods of moisture measurements – Thermal, Conductivity and Capacitive sensors, Microwave, IR and NMR sensors, Application of moisture measurement - Moisture measurement in solids.

UNIT IV TEMPERATURE MEASUREMENT 12

Definitions and standards – Primary and secondary fixed points – Different types of filled in system thermometers – Sources of errors in filled in systems and their compensation – Bimetallic thermometers – IC sensors – Thermocouples: Laws of thermocouple, Fabrication of industrial thermocouples, Reference junctions compensation, Signal conditioning for thermocouple, Commercial circuits for cold junction compensation, Response of thermocouple, Special techniques for measuring high temperature using thermocouple – Radiation fundamentals - Radiation methods of temperature measurement – Total radiation pyrometers – Optical pyrometers – Two color radiation pyrometers – Fiber optic sensor for temperature measurement – Thermograph, Temperature switches and thermostats – Temperature sensor selection, Installation and Calibration.

UNIT V PRESSURE MEASUREMENT 9

Units of pressure – Manometers: Different types, Elastic type pressure gauges: Bourdon tube, Bellows, Diaphragms and Capsules - Electrical methods: Elastic elements with LVDT and strain gauges - Capacitive type pressure gauge - Piezo resistive pressure sensor-Resonator pressure sensor - Measurement of vacuum: McLeod gauge, Thermal conductivity gauge, lionization gauges, Cold cathode type and hot cathode type – Pressure gauge selection, installation and calibration using dead weight tester.

TOTAL : 45 PERIODS

COURSE OUTCOMES

At the end of the course, the student will have the:

- **Ability to understand the construction and working of instruments used for measurement of force, torque, speed, acceleration, vibration, density, viscosity, humidity, moisture, temperature.**
- **Ability to select instruments according to the application.**
- **Ability to understand the concept of calibration of instruments and gain knowledge about temperature measurement devices.**
- **Ability to design signal conditioning circuits and compensation schemes for temperature measuring instruments.**
- **Ability to understand the working of instruments used for measurement of pressure.**
- **Ability to measure fiber optic sensor to measure temperature.**

TEXT BOOKS

Doebelin, E.O. and Manik, D.N., "Measurement systems Application and Design", 6th McGraw-Hill Education Pvt. Ltd, 2011.

Jones, B.E., "Instrument Technology", Vol.2, Butterworth-Heinemann, International Edition, 2003.

Liptak, B.G., "Instrumentation Engineers Handbook (Measurement)", CRC Press, 2005.

Patranabis, D., "Principles of Industrial Instrumentation", 3rd Edition, McGraw-Hill Education, 2017.

Eckman D.P., "Industrial Instrumentation", Wiley Eastern Limited, 1990.

Singh,S.K., "Industrial Instrumentation and Control", Tata Mc-Graw-Hill Education Pvt. Ltd., New Delhi, 2009.

Alok Barua, "Lecture Notes on Industrial Instrumentation", NPTEL, E-Learning Course, IIT Kharagpur.
Jayashankar, V., "Lecture Notes on Industrial Instrumentation", NPTEL, E-Learning Course, IIT Madras.
A.K. Sawhney, "A Course in Electronic Measurements and Instrumentation ", Dhanpat Rai & Co. (P) Limited, 2015.

EE8451 LINEAR INTEGRATED CIRCUITS AND APPLICATIONS L T P C 3003

OBJECTIVES:

To impart knowledge on the following topics

Signal analysis using Op-amp based circuits.

Applications of Op-amp.

Functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits.

IC fabrication procedure.

UNIT I IC FABRICATION 9

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance, FETs and PV Cell.

UNIT II CHARACTERISTICS OF OPAMP 9

Ideal OP-AMP characteristics, DC characteristics, AC characteristics, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – Inverting and Non-inverting Amplifiers, summer, differentiator and integrator-V/I & I/V converters.

UNIT III APPLICATIONS OF OPAMP 9 Instrumentation amplifier and its applications for transducer Bridge, Log and Antilog

Amplifiers- Analog multiplier & Divider, first and second order active filters, comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R- 2R ladder and weighted resistor types), A/D converters using opamps.

UNIT IV SPECIAL ICs 9

Functional block, characteristics of 555 Timer and its PWM application - IC-566 voltage controlled oscillator IC; 565-phase locked loop IC, AD633 Analog multiplier ICs.

UNIT V APPLICATION ICs 9

AD623 Instrumentation Amplifier and its application as load cell weight measurement - IC voltage regulators –LM78XX, LM79XX; Fixed voltage regulators its application as Linear power supply - LM317, 723 Variable voltage regulators, switching regulator-SMPS - ICL 8038 function generator IC.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to acquire knowledge in IC fabrication procedure

Ability to analyze the characteristics of Op-Amp

To understand the importance of Signal analysis using Op-amp based circuits.

Functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits.

To understand and acquire knowledge on the Applications of Op-amp

Ability to understand and analyse, linear integrated circuits their Fabrication and Application.

TEXT BOOKS:

David A. Bell, 'Op-amp & Linear ICs', Oxford, 2013.

D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits', II edition, New Age, 2003.

Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI. 2000.

REFERENCES

Fiore,"Opamps & Linear Integrated Circuits Concepts & applications", Cengage, 2010.

Floyd ,Buchla,"Fundamentals of Analog Circuits, Pearson, 2013.

Jacob Millman, Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system', McGraw Hill, 2003.

Robert F.Coughlin, Fredrick F. Driscoll, 'Op-amp and Linear ICs', Pearson, 6th edition,2012.

Sergio Franco, 'Design with Operational Amplifiers and Analog Integrated Circuits', Mc Graw Hill, 2016.

Muhammad H. Rashid,' Microelectronic Circuits Analysis and Design' Cengage Learning, 2011.

IC8451 CONTROL SYSTEMS LTPC

3204

COURSE OBJECTIVES

To understand the use of transfer function models for analysis physical systems and introduce the control system components.

To provide adequate knowledge in the time response of systems and steady state error analysis.

To accord basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.

To introduce stability analysis and design of compensators

To introduce state variable representation of physical systems

UNIT I SYSTEMS AND REPRESENTATION 9

Basic elements in control systems: – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs.

UNIT II TIME RESPONSE 9

Time response: – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error – Root locus construction- Effects of P, PI, PID modes of feedback control –Time response analysis.

UNIT III FREQUENCY RESPONSE 9

Frequency response: – Bode plot – Polar plot – Determination of closed loop response from open loop response - Correlation between frequency domain and time domain specifications

UNIT IV STABILITY AND COMPENSATOR DESIGN 9

Characteristics equation – Routh Hurwitz criterion – Nyquist stability criterion- Performance criteria – Effect of Lag, lead and lag-lead compensation on frequency response-Design of Lag, lead and lag-lead compensator using bode plots.

UNIT V STATE VARIABLE ANALYSIS 9

Concept of state variables – State models for linear and time invariant Systems – Solution of state and output equation in controllable canonical form – Concepts of controllability and observability.

TOTAL (L: 45+T:30): 75 PERIODS

COURSE OUTCOMES

At the end of the course, the student should have the :

Ability to develop various representations of system based on the knowledge of Mathematics, Science and Engineering fundamentals.
Ability to do time domain and frequency domain analysis of various models of linear system.
Ability to interpret characteristics of the system to develop mathematical model.
Ability to design appropriate compensator for the given specifications.
Ability to come out with solution for complex control problem.
Ability to understand use of PID controller in closed loop system.

TEXT BOOKS

Nagarath, I.J. and Gopal, M., "Control Systems Engineering", New Age International Publishers, 2017.
Benjamin C. Kuo, "Automatic Control Systems", Wiley, 2014.

REFERENCES

Katsuhiko Ogata, "Modern Control Engineering", Pearson, 2015.
Richard C.Dorf and Bishop, R.H., "Modern Control Systems", Pearson Education,2009.
John J.D., Azzo Constantine, H. and Houpis Sttuart, N Sheldon, "Linear Control System Analysis and Design with MATLAB", CRC Taylor& Francis Reprint 2009.
Rames C.Panda and T. Thyagarajan, "An Introduction to Process Modelling Identification and Control of Engineers", Narosa Publishing House, 2017.
M.Gopal, "Control System: Principle and design", McGraw Hill Education, 2012.
NPTEL Video Lecture Notes on "Control Engineering "by Prof. S. D. Agashe, IIT Bombay.

EC8395 COMMUNICATION ENGINEERING LTPC

3 0 0 3

OBJECTIVES:

- **To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues**
- **To study the various analog and digital modulation techniques**
- **To study the principles behind information theory and coding**
- **To study the various digital communication techniques**

UNIT I ANALOG MODULATION 9

Amplitude Modulation – AM, DSBSC, SSBSC, VSB – PSD, modulators and demodulators – Angle modulation – PM and FM – PSD, modulators and demodulators – Superheterodyne receivers

UNITII PULSE MODULATION 9

Low pass sampling theorem – Quantization – PAM – Line coding – PCM, DPCM, DM, and ADPCM And ADM, Channel Vocoder - Time Division Multiplexing, Frequency Division Multiplexing

UNIT III DIGITAL MODULATION AND TRANSMISSION 9

Phase shift keying – BPSK, DPSK, QPSK – Principles of M-ary signaling M-ary PSK & QAM – Comparison, ISI – Pulse shaping – Duo binary encoding – Cosine filters – Eye pattern, equalizers

UNIT IV INFORMATION THEORY AND CODING 9

Measure of information – Entropy – Source coding theorem – Shannon–Fano coding, Huffman Coding, LZ Coding – Channel capacity – Shannon-Hartley law – Shannon's limit – Error control codes – Cyclic codes, Syndrome calculation – Convolution Coding, Sequential and Viterbi decoding

UNIT V SPREAD SPECTRUM AND MULTIPLE ACCESS 9

PN sequences – properties – m-sequence – DSSS – Processing gain, Jamming – FHSS – Synchronisation and tracking – Multiple Access – FDMA, TDMA, CDMA,

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- **Ability to comprehend and appreciate the significance and role of this course in the present contemporary world**
- **Apply analog and digital communication techniques.**
- **Use data and pulse communication techniques.**
- **Analyze Source and Error control coding.**

TEXT BOOKS:

1. **H Taub, D L Schilling, G Saha, "Principles of Communication Systems" 3/e, TMH 2007**
2. **S. Haykin "Digital Communications" John Wiley 2005**

REFERENCES:

1. **B.P.Lathi, "Modern Digital and Analog Communication Systems", 3rd edition, Oxford University Press, 2007**
2. **H P Hsu, Schaum Outline Series – "Analog and Digital Communications" TMH 2006**
3. **B.Sklar, Digital Communications Fundamentals and Applications" 2/e Pearson Education 2007.**

EI8461 DEVICES AND MACHINES LABORATORY LTPC
0 0 4 2

COURSE OBJECTIVES

To facilitate the students to study the characteristics of various semiconductor devices.
To provide practical knowledge on the analysis of regulators, amplifiers and oscillators.
To obtain the no load and load characteristics of D.C machines.
To obtain the speed characteristics of D.C motor.
To find out regulation characteristics of Transformer.

LIST OF EXPERIMENTS FOR DEVICES LAB

Simulation and experimental Characterisation of Semiconductor diode and Zener diode.
Simulation and experimental Characterisation of a NPN Transistor under common emitter configurations.
Simulation and experimental Characterisation of FET and JFET(Draw the equivalent circuit)
Simulation and experimental Characterisation of UJT and generation of saw tooth waveforms
Simulation and experimental Characterisation of RC and LC phase shift oscillators.
Simulation and experimental Characterisation of Monostable and Astable multivibrators.
Simulation of passive filters.
Simulation of Single Phase half-wave and full wave rectifiers with inductive and capacitive filters.
Characteristics of SCR and application as a controlled rectifier.

Minimum of five experiments to be offered from the list. Additional one or two experiments can be framed beyond the list or curriculum

LIST OF EXPERIMENTS FOR MACHINES LAB

Open circuit characteristics of D.C. shunt generator.

Load characteristics of D.C. shunt generator.

Load test on D.C. shunt motor.

Speed control of D.C. shunt motor.

Open circuit and short circuit tests on single phase transformer (Determination of equivalent circuit parameters).
Load test on single phase induction motor.

Minimum of five experiments to be offered from the list. Additional one or two experiments can be framed beyond the list or curriculum

TOTAL : 60 PERIODS

60

COURSE OUTCOMES (COs)

Gain knowledge on the proper usage of various electronic equipment and simulation tools for design and analysis of electronic circuits.

Get hands-on experience in studying the characteristics of semiconductor devices.

Ability to analyze various electronic circuits such as voltage regulators, transistor amplifiers and oscillators.

Ability to make use of basic concepts to obtain the no load and load characteristics of D.C machines.

Analyze and draw conclusion from the characteristics obtained by conducting experiments on machines.

Ability to carry out the Experiments in batches to motivate the Team work.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

FOR DEVICES LAB:

S.No	Name of the Equipment / Components
	Circuit Simulation Software (5 Users) (Pspice / Matlab /other Equivalent software Package) with PC.
	Sufficient number of power supply, Galvanometer, Bread board, Multimeter, resistors, Decade Capacitance box, Decade resistance box, Decade Inductance box, CRO.
	Semiconductor devices like Diode, Zener Diode, NPN Transistors, JFET, and UJT.

FOR MACHINES LAB:

S.No	Name of the Equipment / Components	Quantity Required
1.	DC Shunt Motor with Loading Arrangement	3
2.	Single Phase Transformer	3
3.	Single Phase Induction Motor with Loading Arrangement	1
4.	Single Phase Auto Transformer	3
5.	Single Phase Resistive Loading Bank	2
6.	Sufficient number of Ammeters, Voltmeters, (or multimeters), switches, tachometers, Wattmeters.	2

EE8461 LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY **L T P C 0 0 4 2**

OBJECTIVES:

To learn design, testing and characterizing of circuit behavior with digital and analog ICs.

LIST OF EXPERIMENTS

Implementation of Boolean Functions, Adder and Subtractor circuits.

Code converters: Excess-3 to BCD and Binary to Gray code converter and vice-versa

Parity generator and parity checking

Encoders and Decoders

Counters: Design and implementation of 3-bit modulo counters as synchronous and Asynchronous types using FF IC's and specific counter IC.

Shift Registers: Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitability IC's.

Study of multiplexer and de multiplexer

Timer IC application: Study of NE/SE 555 timer in Astability, Monostability operation.

Application of Op-Amp: inverting and non-inverting amplifier, Adder, comparator, Integrator and Differentiator.

Voltage to frequency characteristics of NE/ SE 566 IC.

Variability Voltage Regulator using IC LM317.

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should have the :

- **Ability to understand and implement Boolean Functions.**
- **Ability to understand the importance of code conversion**
- **Ability to Design and implement 4-bit shift registers**
- **Ability to acquire knowledge on Application of Op-Amp**
- **Ability to Design and implement counters using specific counter IC.**

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS: (3 per Batch)

S.No	Name of the equipments / Components	Quantity Required	Remarks
1	Dual ,(0-30V) variability Power Supply	10	-
2	CRO	9	30MHz
3	Digital Multimeter	10	Digital
4	Function Generator	8	1 MHz
5	IC Tester (Analog)	2	
6	Bread board	10	
7	Computer (PSPICE installed)	1	
	Consumabilitys (sufficient quantity)		
	IC 741/ IC NE555/566/565		
	Digital IC types		
	LED		
	LM317		
	LM723		
	ICSG3524 / SG3525		
	Transistor – 2N3391		

	Diodes, IN4001,BY126
	Zener diodes
	Potentiometer
	Step-down transformer 230V/12-0-12V
	Capacitor
	Resistors 1/4 Watt Assorted
	Single Strand Wire

EI8551 ANALYTICAL INSTRUMENTS LTPC

3003

COURSE OBJECTIVES

To understand the theory and operational principles of instrumental methods for identification and quantitative analysis of chemical substances by different types of spectroscopy.

To impart fundamental knowledge on gas chromatography and liquid chromatography.

To integrate a fundamental understanding of the underlining principles of physics as they relate to specific instrumentation used for gas analyzers and pollution monitoring instruments.

To impart knowledge on the important measurement in many chemical processes and laboratories handling liquids or solutions.

To understand the working principle, types and applications of NMR and Mass spectroscopy.

UNIT I SPECTROPHOTOMETRY 9

Spectral methods of analysis – Beer-Lambert law – UV-Visible spectroscopy – IR Spectrophotometry - FTIR spectrophotometry – Atomic absorption spectrophotometry - Flame emission and atomic emission photometry – Construction, working principle, sources detectors and applications.

UNIT II CHROMATOGRAPHY 9

General principles – classification – chromatographic behavior of solutes – quantitative determination – Gas chromatography – Liquid chromatography – High-pressure liquid chromatography – Applications.

UNIT III INDUSTRIAL GAS ANALYZERS AND POLLUTION MONITORING INSTRUMENTS 9

Gas analyzers – Oxygen, NO 2 and H2S types, IR analyzers, thermal conductivity detectors, analysis based on ionization of gases.

Air pollution due to carbon monoxide, hydrocarbons, nitrogen oxides, sulphur dioxide estimation - Dust and smoke measurements.

UNIT IV pH METERS AND DISSOLVED COMPONENT ANALYZERS 9

Selective ion electrodes - Principle of pH and conductivity measurements - dissolved oxygen analyzer – Sodium analyzer – Silicon analyzer – Water quality Analyzer.

UNIT V NUCLEAR MAGNETIC RESONANCE AND MASS SPECTROMETRY 9

NMR – Basic principles – Continuous and Pulsed Fourier Transform NMR spectrometer – Mass Spectrometry – Sample system – Ionization methods – Mass analyzers – Types of mass spectrometry.

TOTAL : 45 PERIODS

COURSE OUTCOMES (COs)

1 . Ability to understand the fundamental principles of selective analytical instruments used in medical diagnosis, quality assurance & control and research studies.

Ability to assess and suggest a suitable analytical method for a specific purpose, and evaluate sensitivity, important sources of interferences and errors, and also suggest alternative analytical methods for quality assurance.

Ability to critically evaluate the strengths and limitations of the various instrumental methods.

Ability to develop critical thinking for interpreting analytical data.

Ability to understand the working principle, types and applications of NMR and Mass spectroscopy

TEXT BOOKS:

Willard, H.H., Merritt, L.L., Dean, J.A., Settle, F.A., "Instrumental methods of analysis", CBS publishing & distribution, 7th Edition, 2012.

Braun, R.D., "Introduction to Instrumental Analysis", Pharma Book Syndicate, Singapore, 2006.

Robert E. Sherman., "Analytical Instrumentation", Instruments Society of America, 1996.

REFERENCES:

Khandpur, R.S., "Handbook of Analytical Instruments", Tata McGraw-Hill publishing Co. Ltd.,2nd Edition 2007.

Ewing, G.W., "Instrumental Methods of Chemical Analysis", McGraw-Hill, 5th Edition reprint 1985. (Digitized in 2007).

Liptak, B.G., "Process Measurement and Analysis", CRC Press, 5th Edition, 2015.

NPTEL lecture notes on, "Modern Instrumental methods of Analysis" by Dr.J.R. Mudakavi, IISC, Bangalore.

EI8552 INDUSTRIAL INSTRUMENTATION - II LTPC 3003

COURSE OBJECTIVES

To introduce variable head type flow meters
To introduce quantity meters, air flow meters and mass flow meters To educate on electrical type flow meters
To educate on the level measurement techniques
To educate on Viscosity, Humidity and Moisture content

UNIT I VARIABLE HEAD TYPE FLOWMETERS 9

Expression for flow rate through restriction(compressible and incompressible flow) - Orifice plate: different types of orifice plates – Cd variation – pressure tappings – Venturi tube – Flow nozzle – Dall tube – Pitot tube: combined pitot tube, averaging pitot tube – Installation and applications of head flow meters

UNIT II QUANTITY METERS, AREA FLOW METERS AND MASS FLOW METERS 9

Positive displacement flow meters:

Nutating disc, Reciprocating piston and Oval gear flow meters – Inferential meter – Turbine flow meter – Variable Area flow meter: Rotameter –theory, characteristics, installation and applications – Mass flow meter :– Angular momentum – Thermal, Coriolis type mass flow meters – Calibration of flow meters: – Dynamic weighing method

UNIT III ELECTRICAL TYPE FLOW METERS 9

Principle and constructional details of Electromagnetic flow meter – Ultrasonic flow meters – Laser Doppler anemometer – Vortex shedding flow meter – Target flow meter – Guidelines for selection of flow meter – Open channel flow measurement – Solid flow rate measurement

UNIT IV LEVEL MEASUREMENT 9

Level measurement: Float gauges - Displacer type – D/P methods -Bubbler system-Load cell – Electrical types – Conductivity sensors – Capacitive sensors – Nucleonic gauge - Ultrasonic gauge – Boiler drum level measurement :– Differential pressure method and Hydrastep method - Solid level measurement.

UNIT V TRANSMITTERS 9

Pneumatic transmitter: Operation - Electronic transmitter: Study of 2 wire and 4 wire transmitters – Operation of Electronics and Smart transmitters – Principle of operation of flow, level, temperature and pressure transmitters – Installation and Calibration of smart and conventional transmitters.

TOTAL : 45 PERIODS

COURSE OUTCOMES (COs)

At the end of the course, the student will have the:

Ability to understand the construction, installation and working of different variable head type flow meters.

Able to understand the construction, working and calibration of different quantity flow meters, variable area flow meters, mass flow meters, electrical type, open channel and solid flow meters.

Ability to gain knowledge about the construction, working and calibration of different type of transmitters.

Ability to choose appropriate flow meters or level sensor for an application.

TEXT BOOKS:

Doebellin, E.O. and Manik D.N., "Measurement systems Application and Design", 5th Edition, Tata McGraw-Hill Education Pvt. Ltd., 2007.

Patranabis, D., "Principles of Industrial Instrumentation", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2010.

REFERENCES:

Liptak, B.G., Instrumentation Engineers Handbook (Measurement), CRC Press, 2005.

Singh,S.K., Industrial Instrumentation and Control, Tata McGrawHill Education Pvt. Ltd., New Delhi, 2009.

Jain, R.K., Mechanical and Industrial Measurements, Khanna Publishers, Delhi, 1999.

Jayashankar, V., "Lecture Notes on Industrial Instrumentation", NPTEL, E-Learning Course, IIT Madras.

EI8553 PROCESS CONTROL LTPC 2203

COURSE OBJECTIVES

To introduce technical terms and nomenclature associated with Process control domain.

To familiarize the students with characteristics, selection, sizing of control valves.

To provide an overview of the features associated with Industrial type PID controller. To make the students understand the various PID tuning methods.

To elaborate different types of control schemes such as cascade control, feed-forward control and Model Based control schemes.

UNIT I PROCESS MODELLING AND DYNAMICS 6+6

Need for process control – Mathematical Modeling of Processes: Level, Flow, Pressure and Thermal processes – Continuous and batch processes – Self regulation – Servo and regulatory operations – Lumped and Distributed parameter models – Heat exchanger – CSTR – Linearization of nonlinear systems.

UNIT II FINAL CONTROL ELEMENTS 6+6 Actuators: Pneumatic and electric actuators – Control Valve Terminology - Characteristic of

Control Valves: Inherent and Installed characteristics - Valve Positioner – Modeling of a Pneumatically Actuated Control Valve – Control Valve Sizing: ISA S 75.01 standard flow equations for sizing Control Valves – Cavitation and flashing – Control Valve selection

UNIT III CONTROL ACTIONS 6+6

Characteristic of ON-OFF, Proportional, Single speed floating, Integral and Derivative controllers – P+I, P+D and P+I+D control modes – Practical forms of PID Controller – PID Implementation Issues: Bumpless, Auto/manual Mode transfer, Anti-reset windup Techniques – Direct/reverse action.

UNIT IV PID CONTROLLER TUNING 6+6

PID Controller Design Specifications: Criteria based on Time Response and Criteria based Frequency Response - PID Controller Tuning: Z-N and Cohen-Coon methods, Continuous cycling method and Damped oscillation method, optimization methods, Auto tuning – Cascade control – Feed-forward control

UNIT V MODEL BASED CONTROL SCHEMES 6+6

Smith Predictor Control Scheme - Internal Model Controller – IMC PID controller –- Three-element Boiler drum level control - Introduction to Multi-loop Control Schemes – Control Schemes for CSTR, and Heat Exchanger - P&ID diagram.

TOTAL : 60 PERIODS

COURSE OUTCOMES (COs)

Ability to understand technical terms and nomenclature associated with Process control domain.

Ability to build models using first principles approach as well as analyze models.

Ability to Design, tune and implement PID Controllers to achieve desired performance for various processes

Ability to Analyze Systems and design & implement control Schemes for various Processes.

Ability to Identify, formulate and solve problems in the Process Control Domain.

TEXT BOOKS:

Seborg, D.E., Edgar, T.F. and Mellichamp, D.A., "Process Dynamics and Control", Wiley John and Sons, 2nd Edition, 2003.

Bequette, B.W., "Process Control Modeling, Design and Simulation", Prentice Hall of India, 2004.

Stephanopoulos, G., "Chemical Process Control - An Introduction to Theory and Practice", Prentice Hall of India, 2005.

REFERENCES:

Coughanowr, D.R., "Process Systems Analysis and Control", McGraw - Hill International Edition,2004.

Curtis D. Johnson, "Process Control Instrumentation Technology", 8th Edition, Pearson, 2006.

Considine, D.M., Process Instruments and Controls Handbook, Second Edition, McGraw, 1999.

Bela.G.Liptak., "Process Control and Optimization"., Instrument Engineers' Handbook., volume 2, CRC press and ISA, 2005.

Ramesh C. Panda., T.Thyagarajan., "An Introduction to Process Modelling Identification and Control for Engineers" Narosa Publishing house Pvt. Ltd, 2017.

EE8551 MICROPROCESSOR AND MICROCONTROLLERS L T P C
3 0 0 3

OBJECTIVES:

To impart knowledge on the following Topics

Architecture of µP8085 & µC 8051

Addressing modes & instruction set of 8085 & 8051.

Need & use of Interrupt structure 8085 & 8051.

Simple applications development with programming 8085 & 8051

UNIT I 8085 PROCESSOR 9

Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts.

UNIT II PROGRAMMING OF 8085 PROCESSOR 9

Instruction -format and addressing modes – Assembly language format – Data transfer, data manipulation& control instructions – Programming: Loop structure with counting & Indexing – Look up tability - Subroutine instructions - stack.

UNIT III 8051 MICRO CONTROLLER 9

Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts- Data Transfer, Manipulation, Control Algorithms& I/O instructions, Comparison to Programming concepts with 8085.

UNIT IV PERIPHERAL INTERFACING 9

Study on need, Architecture, configuration and interfacing, with ICs: 8255, 8259, 8254, 8279, - A/D and D/A converters &Interfacing with 8085& 8051.

UNIT V MICRO CONTROLLER PROGRAMMING & APPLICATIONS 9

Simple programming exercises- key board and display interface –Control of servo motor-stepper motor control- Application to automation systems.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to acquire knowledge in Addressing modes & instruction set of 8085 & 8051. Ability to need & use of Interrupt structure 8085 & 8051.

Ability to understand the importance of Interfacing

Ability to explain the architecture of Microprocessor and Microcontroller. Ability to write the assembly language programme.

Ability to develop the Microprocessor and Microcontroller based applications.

TEXT BOOKS:

Sunil Mathur &Jeebananda Panda, "Microprocessor and Microcontrollers", PHI Learning Pvt. Ltd, 2016.

R.S. Gaonkar, 'Microprocessor Architecture Programming and Application', with 8085, Wiley Eastern Ltd., New Delhi, 2013.

Muhammad Ali Mazidi & Janice Gilli Mazidi, R.D.Kinely 'The 8051 Micro Controller and Embedded Systems', PHI Pearson Education, 5th Indian reprint, 2003.

REFERENCES

Krishna Kant, "Microprocessor and Microcontrollers", Eastern Company Edition, Prentice Hall of India, New Delhi, 2007.

B.RAM," Computer Fundamentals Architecture and Organization" New age International Private Limited, Fifth edition, 2017.

Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085,8086,8051,McGraw Hill Edu,2013.

Ajay V.Deshmukh, 'Microcontroller Theory &Applications', McGraw Hill Edu,2016

Douglas V.Hall, 'Microprocessor and Interfacing', McGraw Hill Edu,2016.

EI8093 UNIT OPERATION AND CONTROL LTPC

3003

COURSE OBJECTIVES

Study the unit operations involved for transportation, mixing and separation of solids.

Study the unit operations involved for transportation, mixing and separation of fluids.

Understand the basic operations involved with heat exchangers, Distillation and chemical reactions.

Gain knowledge about the operations of evaporators and crystallizers, drying and cooling towers.

Gain knowledge on the operation of dryers, distillation column, refrigerators and chemical reactors.

UNIT I MECHANICAL OPERATIONS- I 9

OPERATIONS ON SOLIDS : General Characteristics of solids; Storage and conveying of solids:bunkers, silos, bins and hoppers, transport of solids in bulk, conveyor selection, different types of conveyors; Estimation of particle size;Screening methods and equipment; Adjusting particle size:methods of size reduction, classification of equipment, crushers, grinders; size enlargement; Principle of granulation, briquetting, pelletisation and flocculation; Mixing: mixing of powders; Separation: Electrostatic and magnetic separators, applications.

UNIT II MECHANICAL OPERATIONS-II 9

OPERATIONS ON FLUIDS: Transport of fluids; Mixing and agitation: Mixing of liquids, selection of suitable mixers; Separation: Gravity settling, sedimentation, thickening, double cone classifier, centrifugal separation; Cyclones - Operation, equipment, control and applications.

UNIT III HEAT TRANSFER- I AND ITS APPLICATIONS 9

Heat exchangers: Single pass and multi pass heat exchangers, condensers, reboilers Combustion process in thermal power plant; Distillation: Binary distillation, Batch distillation, controls and operations, Chemical reactors.

UNIT IV HEAT TRANSFER- II 9

Theory of evaporation; single effect and multiple effect evaporators; Crystallization; nucleation and growth, classification of crystallizers; Drying: classification of Dryers, batch and continuous dryers, dryers for solids and slurries and cooling Towers, Refrigeration.

UNIT V CASE STUDY 9

Unit Operations and Control schemes applied to Thermal Power plant, Steel Industry, Paper and Pulp Industry, Leather Industry.

TOTAL : 45 PERIODS

COURSE OUTCOMES (COs)

Apply the knowledge on solids & fluids to handle the raw materials.
Select and apply relevant handling techniques to convert the solids and fluids for specificapplications.
Come out with solutions for simple/complex problems in heat transfer and design the heatexchange
equipment for different applications such as distillation, boilers.
Able to carry out multidisciplinary projects using heat transfer, mass transfer concepts.
Gain ability for lifelong learning of new techniques and developments in various types of unit operations in industries.

TEXT BOOKS:

Balchen ,J.G., and Mumme, K.J., " Process Control structures and applications", Van Nostrand Reinhold Co., New York, 1988.
Warren L. McCabe, Julian C. Smith and Peter Harriot, "Unit Operations of Chemical Engineering", McGraw-Hill International Edition, New York, Sixth Edition, 2001.
James R.couper, Roy Penny, W., James R.Fair and Stanley M.Walas, "Chemical Process Equipment :Selection and Design", Gulf Professional Publishing, 2010.

REFERENCES:

Waddams, A.L., "Chemicals from petroleum", Butler and Taner Ltd., UK, 1968.
Liptak, B.G., "Process measurement and analysis", Chilton Book Company, USA, 1995.
Luyben W.C., "Process Modeling, Simulation and Control for Chemical Engineers", McGraw-Hill International edition, USA, 1989.

EI8561 INDUSTRIAL INSTRUMENTATION LABORATORY L T P C 004 2

COURSE OBJECTIVES

To impart an adequate knowledge and expertise to handle equipment generally available in an industry
To make the students aware about calibration of meters, sensors and transmitters.
To make the students conscious about the working and operation of different types of analytical Instruments.
To identify, formulate, and analyze problems regarding sensors and transmitter

LIST OF EXPERIMENTS

Measurement of speed, torque and vibration
Calibration of ammeter, voltmeter and wattmeter using multifunction calibrator
Calibration of pressure gauge using dead weight tester.
Measurement of level using d/p transmitter and fibre optics system.
Measurement of flow using
Discharge coefficient of orifice plate

Calibration of Rotameter.
Design and Testing of Electromagnetic Flow meters.
Measurement of temperature using IR thermometer and IC sensor
Measurement of Absorbance and Transmittance of Test solutions using UV-Spectrometer.
Measurement of Conductivity, Moisture and Viscosity of test solutions.
Standardization and measurement of pH values of different solutions
Measurement and analysis of ECG and pulse rate.

Minimum of ten experiments to be offered from the list. Additional one or two experiments can be framed beyond the list or curriculum

TOTAL: 60 PERIODS

COURSE OUTCOMES (COs)

Ability to experimentally measure industrial process parameters such as flow, level, temperature, pressure and viscosity.
Ability to measure and analyze pH, conductivity, UV absorbance and transmittance.
Ability to measure and analyze physiological parameters such as BP, ECG and pulse rate.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1.	**Orifice plate**	**1**
2.	**Dead weight tester with pressure gauge**	**1**
3.	**Torque trainer**	**1**
4.	**Saybolt Viscometer**	**1**
5.	**Vacuum gauge**	**1**
6.	**DP transmitter**	**1**
7.	**UV – Visible spectrophotometer**	**1**
9.	**pH meter**	**1**
10.	**Conductivity meter**	**1**
11.	**ECG trainer**	**1**
12.	**Pulse rate trainer**	**1**

tacho meter

EE8681	**MICROPROCESSORS AND MICROCONTROLLERS LABORATORY**	**L**	**T**	**P**	**C**
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OBJECTIVES:

To provide training on programming of microprocessors and microcontrollers and understand the interface requirements.
To simulate various microprocessors and microcontrollers using KEIL or Equivalent simulator.

LIST OF EXPERIMENTS

Simple arithmetic operations: addition / subtraction / multiplication / division.
Programming with control instructions:
Ascending / Descending order, Maximum / Minimum of numbers.
Programs using Rotate instructions.
Hex / ASCII / BCD code conversions.

Interface Experiments: with 8085

A/D Interfacing. & D/A Interfacing.

Traffic light controller.

I/O Port / Serial communication

Programming Practices with Simulators/Emulators/open source

Read a key ,interface display

Demonstration of basic instructions with 8051 Micro controller execution, including:

Conditional jumps & looping

Calling subroutines.

Programming I/O Port and timer of 8051

study on interface with A/D & D/A

Study on interface with DC & AC motors

10 Application hardware development using embedded processors.

TOTAL: 60 PERIODS

OUTCOMES:

Ability to understand and apply computing platform and software for engineering problems.

Ability to programming logics for code conversion.

Ability to acquire knowledge on A/D and D/A.

Ability to understand basics of serial communication.

Ability to understand and impart knowledge in DC and AC motor interfacing. Ability to understand basics of software simulators.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Sl.No.	Description of Equipment	Quantity required
1.	8085 Microprocessor Trainer with Power Supply	15
2.	8051 Micro Controller Trainer Kit with power supply	15
3.	8255 Interface boards	5
4.	8251 Interface boards	5
5.	8259 Interface boards	5
6.	8279 Keyboard / Display Interface boards	5
7.	8254 timer/ counters	5
8.	ADC and DAC cards	5
9.	AC & DC motor with Controller s	5
10.	Traffic Light Control Systems	5

IC8651 ADVANCED CONTROL SYSTEM LTPC

22 03

OBJECTIVES:

- **To provide knowledge on design state feedback control and state observer.**
- **To provide knowledge in phase plane analysis.**
- **To give basic knowledge in describing function analysis.**
- **To study the design of optimal controller.**
- **To study the design of optimal estimator including Kalman Filter**

UNIT I STATE VARIABLE ANALYSIS 6+6

Introduction- concepts of state variables and state model-State model for linear continuous time systems, Diagonalisation- solution of state equations- Concepts of controllability and observability.

UNIT II STATE VARIABLE DESIGN 6+6

Introduction to state model: Effect of state feedback - Pole placement design: Necessary and sufficient condition for arbitrary pole placement, State regulator design Design of state observers-Separation principle- Design of servo systems: State feedback with integral control.

UNIT III SAMPLED DATA ANALYSIS 6+6

Introduction spectrum analysis of sampling process signal reconstruction difference equations The Z transform function, the inverse Z transform function, response of Linear discrete system, the Z transform analysis of sampled data control systems, response between sampling instants, the Z and S domain relationship. Stability analysis and compensation techniques.

UNIT IV NON LINEAR SYSTEMS 6+6

Introduction, common physical nonlinearites, The phase plane method: concepts, singular points, stability of non linear systems, construction of phase trajectories system analysis by phase plane method. The describing function method, stability analysis by describing function method, Jump resonance.

UNIT V OPTIMAL CONTROL 6+6

Introduction: Classical control and optimization, formulation of optimal control problem, Typical optimal control performance measures - Optimal state regulator design: Lyapunov equation, Matrix Riccati equation - LQR steady state optimal control – Application examples.

TOTAL: 60 PERIODS

OUTCOMES:

- **Able to design state feedback controller and state observer.**
- **Able to understand and analyse linear and nonlinear systems using phase plane method.**
- **Able to understand and analyse nonlinear systems using describing function method.**
- **Able to understand and design optimal controller.**
- **Able to understand optimal estimator including Kalman Filter.**
- **Ability to apply advanced control strategies to practical engineering problems.**

TEXT BOOKS:

- **M.Gopal, "Digital Control and State Variable Methods", 4th edition, Mc Graw Hill India, 2012**
- **K. Ogata, 'Modern Control Engineering', 5th Edition, Pearson, 2012.**
- **K. P. Mohandas, "Modern Control Engineering", Sanguine Technical Publishers, 2006.**

REFERENCES:

M.Gopal, Modern Control System Theory, 3rd edition, New Age International Publishers, 2014.

William S Levine, "Control System Fundamentals," The Control Handbook, CRC Press, Tayler and Francies Group, 2011.

Ashish Tewari, 'Modern Control Design with Matlab and Simulink', John Wiley, New Delhi, 2002.

T. Glad and L. Ljung,, "Control Theory –Multivariable and Non-Linear Methods", Taylor & Francis, 2002.

D.S.Naidu, "Optimal Control Systems" First Indian Reprint, CRC Press, 2009.

EI8651 LOGIC AND DISTRIBUTED CONTROL SYSTEM LTPC

3003

COURSE OBJECTIVES

To give an overview of the automation technologies such as PLCs, SCADA and DCS used in industries.

To provide a fundamental understanding of the different languages used for PLC Programming

To provide insight into some of the advanced principles those are evolving for present and future automation.

UNIT I PLC & SCADA 9

PLC: Evolutions of PLCs – Programmable Controllers – Architecture, I/O modules – Comparative study of Industrial PLCs.

SCADA: Remote terminal units- Master station - Communication architectures.

UNIT II BASICS OF PLC PROGRAMMING(LADDER) 9

Basics of PLC programming – Ladder Logic – Relay type instructions – Timer/Counter instructions – Program control instructions – Data manipulation and math instructions – Programming Examples.

UNIT III PLC PROGRAMMING (OTHER LANGUAGES) 9

Functional block programming - Sequential function chart – Instruction list – Structured text programming – PLC controlled sequential Process Examples.

UNIT IV DISTRIBUTED CONTROL SYSTEM 9

DCS: Evolution & types – Hardware architecture – Field control station – Interfacing of conventional and smart field devices (HART and FF enabled) with DCS Controller – Communication modules – Operator and Engineering Human interface stations – Study of any one DCS available in market.

UNIT V ADVANCED TOPICS IN AUTOMATION 9

Introduction to Networked Control systems – Plant wide control – Internet of things – Cloud based Automation – OLE for Process Control – Safety PLC – Case studies: PLC - SCADA - DCS.

TOTAL : 45 PERIODS

COURSE OUTCOMES (COs)

Ability to understand all the important components such as PLC, SCADA, DCS,I/O modules and field devices of an industrial automation system.

Ability to develop PLC program in different languages for industrial sequential

applications.
Able to select and use most appropriate automation technologies for a given application.
Ability to gain knowledge on the recent developments in industrial automation.

TEXT BOOKS:

F.D. Petruzella, Programmable Logic Controllers, Tata Mc-Graw Hill, Third edition, 2010
Michael P. Lukas, Distributed Control Systems: Their Evaluation and Design, Van Nostrand Reinhold Co., 1986
D. Popovic and V.P.Bhatkar,' Distributed computer control for industrial Automation' Marcel Dekker, Inc., Newyork ,1990.

REFERENCES:

Clarke, G., Reynders, D. and Wright, E., "Practical Modern SCADA Protocols: DNP3,4. 60870.5 and Related Systems", Newnes, 1st Edition, 2004.
Hughes, T.A., "Programmable Logic Controllers: Resources for Measurements and Control Series", 3rd Edition, ISA Press, 2004.
McMillan, G.K., "Process/Industrial Instrument and Controls Handbook", 5th Edition, McGraw- Hill handbook, New York, 1999.
NPTEL Notes on, "Programmable Logic Control System" by Department of Electrical Engg., IIT Kharagpur.

CS8391 DATA STRUCTURES LTPC
3003

OBJECTIVES:

To understand the concepts of ADTs
To Learn linear data structures – lists, stacks, and queues To understand sorting, searching and hashing algorithms To apply Tree and Graph structures

UNIT I LINEAR DATA STRUCTURES – LIST 9

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation —– singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES 9

Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression - Queue ADT – Operations - Circular Queue – Priority Queue - deQueue – applications of queues.

UNIT III NON LINEAR DATA STRUCTURES – TREES 9

Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree - Heap – Applications of heap.

UNIT IV NON LINEAR DATA STRUCTURES - GRAPHS 9

Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES 9

Searching- Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Implement abstract data types for linear data structures.

Apply the different linear and non-linear data structures to problem solutions. Critically analyze the various sorting algorithms.

TEXT BOOKS:

Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education,1997.

Reema Thareja, "Data Structures Using C", Second Edition , Oxford University Press, 2011

REFERENCES:

Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.

Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education,1983.

Stephen G. Kochan, "Programming in C", 3rd edition, Pearson Education.

Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, University Press, 2008

EI8092 THERMAL POWER PLANT INSTRUMENTATION LTPC

3 0 0 3

COURSE OBJECTIVES

To make the students familiarize about various power generation methods. To identify various parameters in thermal power plant

To impart knowledge about the different types of controls and control loops.

To familiarize the student with the methods of monitoring different parameters like speed, vibration of turbines and their control.

UNIT I POWER GENERATION METHODS 9

Brief survey of methods of power generation: hydro, thermal, nuclear, solar and wind power – importance of instrumentation in power generation – thermal power plants: building blocks, details of boiler processes P&I diagram of boiler – cogeneration.

UNIT II MEASUREMENTS IN POWER PLANTS 9

Electrical measurements: current, voltage, power, frequency, power factor – non electrical parameters: flow of feed water, fuel, air, steam pressure and steam temperature – smoke density measurement – Flue gas oxygen analyzer – pollution monitoring instruments.

UNIT III FURNACE CONTROL 9

Coal handling: Pulverizers - Furnace Draught: natural draught, forced draught, induced draught, power requirements for draught systems - Combustion control: Fuel/Air ratio, combustion efficiency, excess air, parallel and cross limited combustion control- soot-blowing operation.

UNIT IV BOILER CONTROL 9

Boiler metal temperature measurement, pressure measuring devices – Boiler feed water processing and control - drum level measurement methods - steam temperature control: main steam and reheat steam temperature control, superheater control, deaerator control – distributed control system in power plants – interlocks in boiler operation.

UNIT V TURBINE CONTROL 9 Speed measurement, rotor and casing movement- vibration - shell temperature monitoring and control - steam pressure control - lubricant oil temperature - cooling system.

TOTAL : 45 PERIODS

COURSE OUTCOME:

Understanding various power generation process.
Identify important parameter to be monitored and controlled in thermal power plant.
Knowledge about various building blocks and instruments involved in thermal power plant and its controlling process.

TEXT BOOKS

Sam G. Dukelow, The control of Boilers, instrument Society of America, 1991.
Modern Power Station Practice, Vol.6, Instrumentation, Controls and Testing, Pergamon Press,

Krishnaswamy KM, Bala P, Bala MP, "Power Plant Instrumentation," Prentice Hall, 2013
Elonka.S.M.and Kohal A.L., Standard Boiler Operations, McGraw-Hill, New Delhi, 1994.
Jain R.K., Mechanical and industrial Measurements, Khanna Publishers, New Delhi, 2008

CS8381 DATA STRUCTURES LABORATORY LTPC
0 042

OBJECTIVES

To implement linear and non-linear data structures
To understand the different operations of search trees To implement graph traversal algorithms
To get familiarized to sorting and searching algorithms

Array implementation of Stack and Queue ADTs
Array implementation of List ADT
Linked list implementation of List, Stack and Queue ADTs
Applications of List, Stack and Queue ADTs
Implementation of Binary Trees and operations of Binary Trees
Implementation of Binary Search Trees

Implementation of AVL Trees
Implementation of Heaps using Priority Queues.
Graph representation and Traversal algorithms
Applications of Graphs
Implementation of searching and sorting algorithms
Hashing – any two collision techniques

TOTAL : 60 PERIODS

OUTCOMES

At the end of the course, the students will be able to:

Write functions to implement linear and non-linear data structure operations

Suggest appropriate linear / non-linear data structure operations for solving a given problem

Appropriately use the linear / non-linear data structure operations for a given problem

Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval

EI8661 PROCESS CONTROL LABORATORY LTPC
0042

OBJECTIVES:

To experimentally verify the process control concepts on the selected process control loops.
To impart theoretical and practical skills in process identification and PID controller tuning
To make the students aware of basic and advanced control schemes

LIST OF EXPERIMENTS:

Simulation Based Experiments

Simulation of lumped /distributed parameter system

Mathematical model of a typical industrial process using nonparametric identification methods

Tuning of PID Controller for mathematically described processes

PID Enhancements (Cascade and Feed-forward Control Schemes)

Design and Implementation of Multi-loop PID Controller on the simulated model of a typical industrial process.

Study of AC and DC drives.

Hardware based experiments

Characteristics of Pneumatically Actuated Control Valve (with and without Positioner).

Study and control of flow process using Compact Flow Control Unit.

Control of Level and Pressure using Process Control Training Plant.

Design and implementation of ON/OFF Controller for the Temperature Process.

Design and implementation of Interacting and non-interacting system

Design and implementation of adaptive or model predictive control schemes

Minimum of ten experiments to be offered from the list. Additional one or two experiments can be framed beyond the list or curriculum

OUTCOMES:

Ability to understand and analyze process control engineering problems.

Be able to build dynamic models using input – output data of a process

Ability to working with real time control loops(flow/level/temperature/pressure)

Get exposed to simulation tools such as MATLAB/LABVIEW/ASPEN

Ability to learn and implement simple adaptive and model based control schemes

TOTAL : 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Flow process station with all accessories
Analog / Digital PID controller
Control valve setup (with position for varying ΔP across the valve)
Flow meter
Level process station with all accessories
Temperature process station with all accessories
Pressure process station with all accessories
Personal computer-15 nos
MATLAB software
Two tank system with following accessories.

HS8581	PROFESSIONAL COMMUNICATION	LTPC
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OBJECTIVES: The course aims to:

Enhance the Employability and Career Skills of students Orient the students towards grooming as a professional Make them Employable Graduates

Develop their confidence and help them attend interviews successfully.

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -— questioning and clarifying –GD strategies-activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress-networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes.

TOTAL : 30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:

- **Make effective presentations**
- **Participate confidently in Group Discussions.**
- **Attend job interviews and be successful in them.**
- **Develop adequate Soft Skills required for the workplace**

Recommended Software

- **Open Source Software**
- **Win English**

REFERENCES:

- **Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015**
- **Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.**
- **E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015**
- **Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014**
- **S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.**

EI8751 INDUSTRIAL DATA NETWORKS LTPC 3003

OBJECTIVES:

To educate on the basic concepts of data networks
To introduce the basics of internetworking and serial communications To provide details on HART and Field buses
To educate on MODBUS, PROFIBUS and other communication protocol To introduce industrial Ethernet and wireless communication

UNIT I DATA NETWORK FUNDAMENTALS 9

Networks hierarchy and switching – Open System Interconnection model of ISO - Data link control protocol - Media access protocol - Command / response - Token passing -CSMA/CD, TCP/IP

UNIT II INTERNET WORKING and RS 232, RS485 9

Bridges - Routers - Gateways - Standard ETHERNET and ARCNET configuration special requirement for networks used for control - RS 232, RS 485 configuration Actuator Sensor (AS) – interface, Devicenet

UNIT III HART AND FIELD BUS 9

Introduction - Evolution of signal standard - HART communication protocol - HART networks - HART commands - HART applications - Fieldbus - Introduction - General Fieldbus architecture - Basic requirements of Fieldbus standard - Fieldbus topology - Interoperability - Interchangeability - Introduction to OLE for process control (OPC).

UNIT IV MODBUS AND PROFIBUS PA/DP/FMS AND FF 9

MODBUS protocol structure - function codes – troubleshooting Profibus, Introduction, Profibus protocol stack, Profibus communication model - communication objects - system operation - troubleshooting - review of foundation fieldbus - Data Highway

UNIT V INDUSTRIAL ETHERNET AND WIRELESS COMMUNICATION 9

Industrial Ethernet, Introduction, 10 Mbps Ethernet, 100 Mbps Ethernet - Radio and wireless communication, Introduction, components of radio link - radio spectrum and frequency allocation - radio MODEMs-Introduction to wireless HART and ISA100.

TOTAL : 45 PERIODS

OUTCOMES: Students will have the

Ability to define basic concepts of data communication and its importance.

Ability to explain the various internetworking devices involved in industrial networks

Ability to explain the various serial communication used in process industries.

Ability to illustrate, compare & explain the working of HART and Field bus used in process digital communication.

Ability to summarize the operation of MODBUS, PROFIBUS protocol & its applications.

Ability to explain and adopt the different Industrial Ethernet protocol and usage of wireless communication in process applications.

TEXT BOOKS:

Steve Mackay, Edwin Wrijut, Deon Reynders, John Park, Practical Industrial Data Networks Design, Installation and Troubleshooting' Newnes Publication, Elsevier First Edition, 2004

William Buchanan, Computer Buses, CRC Press, 2000.

BehrouzForouzan ,Data Communications & Networking ,3RD edition, Tata McGraw hill,2006.

REFERENCES

Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Prentice Hall of India Pvt. Ltd., 5th Edition. 2011.

Theodore S Rappaport, Wireless Communication: Principles and Practice, Prentice Hall of India 2nd Edition, 2001.

William Stallings, Wireless Communication & Networks, Prentice Hall of India, 2nd Edition, 2005.

TOTAL :45. PERIODS

EI8091 INSTRUMENTATION IN PETROCHEMICAL INDUSTRIES LT P C 3003

COURSE OBJECTIVES

To introduce the students the method of oil recovery and the steps involved in oil gas production process.
To make the students understand the process behavior of some of the important unit operations in petrochemical industry through mathematical model.
To familiarize the students to apply knowledge to select the appropriate control strategy for the selective process.
To provide information about the most important derivatives obtained from petroleum products.
To help the students in understanding selection and maintenance of instruments in petrochemical industry.

UNIT I OIL EXTRACTION AND OIL GAS PRODUCTION 9
Techniques used for oil discovery – Oil recovery methods – oil rig system - Overview of oil gas production – oil gas separation – Gas treatment and compression – Control and safety systems.

UNIT II IMPORTANT UNIT OPERATIONS IN REFINERY 9
Distillation Column – Thermal cracking – Catalytic Cracking – Catalytic reforming – mathematical Modeling and selection of appropriate control strategy – Alkylation – Isomerization.

UNIT III DERIVATIVES FROM PETROLEUM 9
Derivatives from methane – Methanol Production – Acetylene production - Derivatives from acetylene —Derivatives from ethylene – Derivatives from propylene.

UNIT IV IMPORTANT PETROLEUM PRODUCTS & MEASUREMENTS 9
BTX from Reformate – Styrene – Ethylene oxide/Ethylene glycol – polyethylene – Polypropylene – PVC production. Parameters to be measured in refinery and petrochemical industry – Selection and maintenance of measuring instruments.

UNIT V SAFETY IN INSTRUMENTATION SYSTEMS 9
Hazardous zone classification – Electrical and Intrinsic safety – Explosion suppression and Deluge systems – Flame, fire and smoke detectors – leak detectors – Guidelines and standards – General SIS Design Configurations – Hazard and Risk Assessment – Failure modes – Operation and Maintenance.

TOTAL : 45 PERIODS

COURSE OUTCOMES (COs)

Gain knowledge on oil gas production process and important unit operations in a refinery
Having gained the process knowledge, ability to develop and analyze mathematical model of selective processes.
Able to develop, analyze and select appropriate control strategy for selective unit operations in a refinery.
Gain knowledge on the most important chemical derivatives obtained from petroleum products. 5. Understand safety instrumentation followed in process industries.

TEXT BOOKS:

Waddams, A.L., "Chemicals from Petroleum", Wiley, 1973. (digitized in 2007).

Balchen, J.G., and Mumme K.I., "Process Control Structures and Applications", Von Nostrand Reinhold Company, New York, 1988.

REFERENCES:

Liptak, B.G., "Instrumentation in Process Industries", Chilton Book Company, 2005. (Digitized in 2008.)

Austin, G.T. and Shreeves, A.G.T., "Chemical Process industries", McGraw-Hill, 2012.

HavardDevold, "Oil and Gas Production Handbook", ABB, 2006.

Paul Gruhn and Harry Cheddie, "Safety Instrumented Systems: Design, Analysis, and Justification", 2nd Edition, ISA Press, 2006.

EC8093 DIGITAL IMAGE PROCESSING LT P C 3003

OBJECTIVES:

- **To become familiar with digital image fundamentals**
- **To get exposed to simple image enhancement techniques in Spatial and Frequency domain.**
- **To learn concepts of degradation function and restoration techniques.**
- **To study the image segmentation and representation techniques.**
- **To become familiar with image compression and recognition methods**

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.

UNIT II IMAGE ENHANCEMENT 9

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.

UNIT III IMAGE RESTORATION 9

Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering

UNIT IV IMAGE SEGMENTATION 9

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V IMAGE COMPRESSION AND RECOGNITION 9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL :45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.

Operate on images using the techniques of smoothing, sharpening and enhancement. Understand the restoration concepts and filtering techniques.

Learn the basics of segmentation, features extraction, compression and recognition methods for color models.

TEXT BOOKS:

Rafael C. Gonzalez, Richard E. Woods, 'Digital Image Processing', Pearson, Third Edition, 2010.

Anil K. Jain, 'Fundamentals of Digital Image Processing', Pearson, 2002.

REFERENCES

Kenneth R. Castleman, 'Digital Image Processing', Pearson, 2006.

Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, 'Digital Image Processing using MATLAB', Pearson Education, Inc., 2011.

D,E. Dudgeon and RM. Mersereau, 'Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.

William K. Pratt, 'Digital Image Processing', John Wiley, New York, 2002

Milan Sonka et al 'Image processing, analysis and machine vision', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

EI8761 INDUSTRIAL AUTOMATION LABORATORY LTPC

0042

OBJECTIVES:

To impart practical skills in

Programming of PLC and DCS.

Sensor data acquisition, data processing and visualization

Interfacing the various field devices with PLC

LIST OF EXPERIMENTS:

Study of PLC field device interface modules (AI,AO,DI,DO modules)

Programming Logic Gates Function in PLC

Implementing Mathematical Operations in PLC

Programming Jump-to-subroutine & return operations in PLC

PLC Exercises:- 1. Traffic Light Control and Filling/Draining Control Operation

PLC Exercise: 1. Reversal of DC Motor Direction 2. ON/OFF Controller for Thermal Process

PC based control of Level Process

On-line Monitoring and Control of a Pilot plant using DCS

PLC based Control of Flow Process

Study of Foundation Fieldbus /IOT/Wireless HART Enabled Transmitter

TOTAL: 60 PERIODS

OUTCOMES:

Ability to understand and Programming of PLC, SCADA and DCS

Ability to working with industrial automation system

Be able to design and implement control schemes in PLC & DCS

Ability to interface field devices with PLC & DCS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. **Programmable Logic controller 5 Nos.**
2. **Programmable Logic controller Software 10 User License**
3. **DAQ card 2 Nos.**
4. **Filling /Draining System 1 No.**
5. **Traffic Light Controller 2 Nos**
6. **DC Motor 5 Nos**
7. **Personal computer- 10 Nos**
8. **DCS along with Interface modules 1 set**
9. **Thermal Process, Level Process & Flow Process stations – 1 set each**
10. **Smart Transmitter - 1 No.**

EI8762 INSTRUMENTATION SYSTEM DESIGN LABORATORY LTPC 0042

OBJECTIVES:

- **To obtain adequate knowledge in design of various signal conditioning circuits and instrumentation systems.**
- **To impart design knowledge of controller, control valve and transmitter.**
- **To acquire the knowledge of piping diagram of industrial standard**
- **To make the students aware of industry project, planning and scheduling.**

LIST OF EXPERIMENTS:

- **Design of Instrumentation amplifier.**
- **Design of active filters – LPF, HPF and BPF**
- **Design of regulated power supply and design of V/I and I/V converters.**
- **Design of linearizing circuits and cold–junction compensation circuit for thermocouples.**
- **Design of signal conditioning circuit for strain gauge and RTD.**
- **Design of orifice plate and rotameter.**
- **Design of Control valve (sizing and flow-lift characteristics)**
- **Design of PID controller (using operational amplifier and microprocessor)**
- **Design of a multi-channel data acquisition system**
- **Design of multi range DP transmitter**
- **Piping and Instrumentation Diagram – case study.**
- **Preparation of documentation of instrumentation project and project scheduling for the above case study. (Process flow sheet, instrument index sheet and instrument specifications sheet, job scheduling, installation procedures and safety regulations).**

Minimum of ten experiments to be offered from the list. Additional one or two experiments can be framed beyond the list or curriculum

TOTAL: 60 PERIODS

OUTCOMES:

- **Ability to understand design of signal conditioning circuits and instrumentation systems.**
- **Ability to design controller, control valve and transmitter.**
- **Be able to design and draw the piping diagram for industrial application projects.**
- **Be able to design the multi-channel data acquisition system and transmitter**

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Expt. No.	List of equipments
	Sufficient number of Monolithic Instrumentation amplifier , Operational amplifiers,IC 7805 and resistors, diodes, capacitors Linear control valve, ON/OFF control valve, Air regulator, Rotameter, Pump
	Sufficient number of IC 741, CRO, Bread board, Signal generator (PID) Microprocessor kit with ADC and DAC section Any Process station (Temperature or Level) with Corresponding sensors, Data acquisition card, and Storage device (microcontroller/microprocessor)
	Flow process station with DP transmitter Loop analyzer Thermocouple & RTD Bonded strain gauge, Loads, orifice plate

IC8811 PROJECT WORK L T P C 002010

OBJECTIVES:

To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 300 PERIODS

OUTCOMES:

On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

EE8072 MEMS AND NANO SCIENCE LTPC

3003

COURSE OBJECTIVES

To provide wide knowledge of semiconductors and solid mechanics to fabricate MEMS devices

To educate on the rudiments of Micro fabrication techniques To educate on applications of MEMS

To provide wide information dealing with nano material and its necessity

To analyze methods involving preparation of nano scale devices

UNIT I OVERVIEW OF MEMS AND MICROSYSTEMS 9

Introduction to MEMS and Microsystems, Need for Miniaturization, MEMS and Microsystem products: Micro gears - Micro turbines – Micromotors - Micro optical devices. Microsystems and Microelectronics, Application of Microsystems in Automotive Industries: Safety - Engine and power trains - Comfort and convenience, Microactuation: Actuation using thermal forces - actuation using shape memory alloys - Actuation using piezoelectric effect - Actuation using Electrostatic forces.

UNIT II MICROSYSTEM FABRICATION PROCESS 9

Photolithography, Ion Implantation, Diffusion, Oxidation: Thermal oxidation-Oxidation by color, Chemical Vapour Depostion, Physical Vapour Deposition: Sputtering, Etching: Chemical- Plasma, Micromaching: Bulk Micromachining - Surface Micromachining.

UNIT III POLYMERS AND OPTICAL MEMS 9

Polymers in MEMS : Polimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon, Optical MEMS : Lenses and Mirrors – Actuators for Active Optical MEMS, Assembly of 3D MEMS – Foundry process.

UNIT IV INTRODUCTION TO NANOSCALE ENGINEERING 9

General Principle of Nano Fabrication, Nano products, Applications of Nano products, Quantum physics, Fluid flow in submicrometers and nanoscales : Rarefied Gas – Knudsen and match numbers – Modleing of micro and nanoscale gas flow, Heat Conduction at Nanoscale, Challenges in Nanoscale Engineering, New materials for NEMS.

UNIT V PATTERNING AND PREPARATION METHODS 9

Bottom up Synthesis – Top down Approach : Precipitation, Mechanical Milling, Colloidal routes, Self assembly, Vapour phase deposition, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE, Patterning : Introduction to optical/UV electron beam and X-ray Lithography systems and processes. Clean rooms: specifications and design, air and water purity, requirements for particular processes.

TOTAL :45 PERIODS

COURSE OUTCOMES (COs)

Ability to understand the operation of micro devices, micro systems and their applications.

Ability to design the micro devices, micro systems using the MEMS fabrication process.

Ability to understand the operation of nao devices, nano systems and their applications.

4. **Ability to design nano devices, nano systems using the preparation methods.**

TEXT BOOKS:

Tai Ran Hsu "MEMS and Microsystems Design : Manufacture and Nano Scale Engineering", John Wiely & Sons, INC., 2nd Edition, 2008.

A.S. Edelstein and R.C. Cammearata, eds., Nanomaterials: Synthesis, Properties and Applications, (Institute of Physics Publishing, Bristol and Philadelphia, 1996).

REFERENCES:

Chang Liu, 'Foundations of MEMS', Pearson Education Inc., 2012.

Mohamed Gad-el-Hak, editor, " The MEMS Handbook", CRC press Baco Raton, 2001.

Nadim Maluf," An Introduction to Micro Electro Mechanical System Design", Artech House, 2000..

G Timp (Editor), Nanotechnology, AIP press/Springer, 1999.

N John Dinardo, Nanoscale charecterisation of surfaces & Interfaces, Second edition, Weinheim Cambridge, Wiley-VCH, 2000.

EI8077 POWER ELECTRONICS AND DRIVES LTPC

3003

COURSE OBJECTIVES

Comprehensive introduction to various power electronic devices, their structure, operating principle and characteristics

Give exposure to Various topologies, working principle and analysis of controlled rectifiers and ac controllers

Detailed knowledge on Classifications, structure, operating principle of dc choppers

Introduction to different types of Inverters , their principle of operation and waveform control Overview on dc and ac drives and their control using power electronic circuits.

UNIT I POWER SEMICONDUCTOR DEVICES AND CHARACTERISTICS 9

Operating principle and switching Characteristics: Power diodes, Power BJT, Power MOSFET, IGBT, SCR, TRIAC, GTO, MCT, Power integrated circuits (PIC) – Drive and Protection circuits – Series and parallel operation – Commutation – Simulation tools.

UNIT IICONTROLLED RECTIFIERS AND AC CONTROLLERS 9

Single phase – Three phase – Half controlled – Fully controlled rectifiers – Dual converters - Effect of source and load inductance - AC voltage controllers –Introduction to Cycloconverters, Matrix converters.

UNIT III DC TO DC CONVERTERS 9

Step up and Step down Chopper – Chopper classification - quadrant of operation – Switching mode Regulators – Buck, Boost, Buck-Boost, and Cuk Regulators.

UNIT IV INVERTERS 9

Voltage source Inverters – Half bridge – Full bridge – Three Phase Bridge Inverters – Voltage control– PWM Techniques – Current Source Inverters: Capacitor Commutated Inverter- Resonant inverters: Series, Parallel, ZVS, ZCS – Introduction to multilevel Inverters.

UNIT V DRIVES AND CONTROL **9**

Static and Dynamic equations of dc and ac machines – Electrical breaking – Rectifier and chopper control of DC drives – Principles of v/f control of AC drives – Open loop and Closed loop schemes for DC and AC drives(Block diagram approach only) – Introduction to vector control of AC drives.

TOTAL : 45 PERIODS

COURSE OUTCOMES (COs)

Ability to explain various devices and their structure, operating characteristics in the field of electronics.
Ability to classify, analyze and design, Control rectifier, chopper and inverter.
Will have ability to apply power electronic circuits for the control of popular applications.
Exposure to design and analyze PE circuit using simulation software.

TEXT BOOKS:

Rashid, M.H., "Power Electronics – Circuits, Devices and Applications", PHI, 3rd Edition, 2004.
Mohan, Udeland and Robbins., "Power Electronics", John Wiley and Sons, New York, 1995.

REFERENCES:

Singh, M.D., and Khanchandani, K.B., "Power Electronics", 2nd Edition., Tata McGraw-Hill, 2011.
Bose, B.K., "Modern Power Electronics and AC Drives", Pearson Education, 2002.
Bimbra, P.S., "Power Electronics", Khanna Publishers, 2006.
Moorthi, V.R., "Power Electronics - Devices, Circuits and Industrial Applications", Oxford University Press, 2005.
NPTEL Lecture Series on "Power Electronics" by Dr.B.G.Fernandes, IIT Bombay.

IC8072 **SYSTEM IDENTIFICATION** **LTPC**
2203

COURSE OBJECTIVES

To understand the mathematical modelling of systems.
To observe systems by their behaviour using Parametric Identification methods using online and offline Data's
To observe systems by their behaviour using Nonparametric Identification Methods using Online and Offline Data's
To estimate and validate the data's using parametric and recursive estimation methods
To perform case studies on electromechanical and process control systems

UNIT I NONPARAMETRIC IDENTIFICATION **6+6**

Transient and frequency analysis methods, impulse and step response methods, correlation method, spectral analysis.

UNIT II PARAMETRIC INDENTIFICATION **6+6**

Steps in identification process, determining model structure and dimension, Linear and nonlinear model structures (ARX, ARMAX, Box-Jenkins, FIR, Output Error models), Input signals: commonly

used signals, spectral properties, and persistent excitation, Residual analysis for determining adequacy of the estimated models.

UNIT III PARAMETRIC ESTIMATION 6+6

Linear regression, least square estimation, statistical analysis of LS methods, Minimizing prediction error- identifiability, bias, Least squares, relation between minimizing the prediction error and the MLE, MAP, Convergence and consistency, asymptotic distribution of parameter estimates, Instrumental Variable Method.

UNIT IV RECURSIVE ESTIMATION 6+6

Forgetting Factor method, Kalman Filter interpretation Identification in practice: Aliasing due to sampling, closed loop data, model order estimation, robustness considerations, model validation.

UNITV CASE STUDIES 6+6

Electro Mechanical Systems, Process Control Systems using Matlab/Equivalent System Identification Toolbox.

TOTAL: 60 PERIODS

COURSE OUTCOMES (COs)

Be familiar with different model structures, parameterization, identifiability, structure determination and order estimation

Be able to perform parameter estimation using different identification techniques

Be able to identify plants online using recursive estimation methods

Be able to set up an experiment, identify a nominal model, assess the accuracy and precision of this model,

Be appropriate design choices to arrive at a validated model.

REFERENCES:

jung, L. System Identification: Theory for the User, 2nd Edition, Prentice-Hall, 1999, ISBN 0-13-656695-2.

Torsten Soderstrom, PetreStoica, System Identification, Prentice Hall International (UK) Ltd. 1989.

Karel J. Keesman, System Identification, An introduction, Springer, 2011.

Zhu, Y. Multivariable System Identification for Process Control, Pergamon, 2001.

Landan ID, "System Identification and Control Design," Prentice Hall

ArunK.Tangirala,Principles of System Identification: Theory and Practice,CRC Press,2014.

EI8074 COMPUTER NETWORKS LTPC

2 2 0 3

OBJECTIVES:

Understand the division of network functionalities into layers.

Be familiar with the components required to build different types of networks Be exposed to the required functionality at each layer

Learn the flow control and congestion control algorithms

Understand the flow of traditional and Ongoing applications.

UNIT I FUNDAMENTALS & LINK LAYER 6+6

Building a network – Requirements - Layering and protocols - Internet Architecture – Network software – Performance ; Link layer Services - Framing - Error Detection - Flow control

UNIT II MEDIA ACCESS & INTERNETWORKING 6+6

Media access control - Ethernet (802.3) - Wireless LANs – 802.11 – Bluetooth - Switching and bridging – Basic Internetworking (IP, CIDR, ARP, DHCP,ICMP)

UNIT III ROUTING 6+6

Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, IPv6), Multicast – addresses – multicast routing (DVMRP, PIM)

UNIT IV TRANSPORT LAYER 6+6

Overview of Transport layer - UDP - Reliable byte stream (TCP) - Connection management – Flow control - Retransmission – TCP Congestion control - Congestion avoidance (DECbit, RED) – QoS – Application requirements

UNIT V APPLICATION LAYER 6+6

Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS - SNMP.

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- **Identify the components required to build different types of networks**
- **Choose the required functionality at each layer for given application**
- **Identify solution for each functionality at each layer**
- **Trace the flow of information from one node to another node in the network Identify the congestion control and Avoidance**
- **Learn the tradition applications and web services**

TEXT BOOK:

Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers, 2011.

REFERENCES:

James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.

Nader. F. Mir, "Computer and Communication Networks", Pearson Prentice Hall Publishers, 2010.

Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill Publisher, 2011.

Behrouz A. Forouzan, "Data communication and Networking", Fourth Edition, Tata McGraw – Hill, 2011.

GE8075 INTELLECTUAL PROPERTY RIGHTS L T P C

3 0 0 3

OBJECTIVE:

To give an idea about IPR, registration and its enforcement.

UNIT I INTRODUCTION 9

Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II REGISTRATION OF IPRs 10

Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad

UNIT III AGREEMENTS AND LEGISLATIONS 10

International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT IV DIGITAL PRODUCTS AND LAW 9

Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection – Unfair Competition – Meaning and Relationship between Unfair Competition and IP Laws – Case Studies.

UNIT V ENFORCEMENT OF IPRs 7

Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

TOTAL:45 PERIODS

OUTCOME:

Ability to manage Intellectual Property portfolio to enhance the value of the firm.

TEXT BOOKS

V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012

S. V. Satakar, "Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002

Deborah E. Bouchoux, "Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets", Cengage Learning, Third Edition, 2012.

Prabuddha Ganguli,"Intellectual Property Rights: Unleashing the Knowledge Economy", McGraw Hill Education, 2011.

Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

EI8071 ADAPTIVE CONTROL LTPC
2203

OBJECTIVE

To study the definition of adaptive control and methods of adaptation. To study the parameter identification of systems. To study the self-tuning of PID controllers based on parameter identification. To study the model reference adaptive control. To study the practical application through case studies.

UNIT I INTRODUCTION 6+6

Introduction to adaptive control – Effects of process variations –Adaptive control schemes – Adaptive control problem – Non-parametric identification – Step response method – Impulse response method – Frequency response method.

UNIT II PARAMETRIC IDENTIFICATION 6+6

Linear in parameter models - ARX – ARMAX – ARIMAX – Least square estimation – Recursive least square estimation – Extended least square estimation – Maximum likelihood estimation – Introduction to non-linear systems identification - Pseudo random binary sequence.

UNIT III SELF-TUNING REGULATOR 6+6

Deterministic in-direct self-tuning regulators – Deterministic direct self-tuning regulators - Introduction to stochastic self-tuning regulators – Stochastic indirect self-tuning regulator.

UNIT IV MODEL REFERENCE ADAPTIVE CONTROLLER 6+6

The MIT rule – Lyapunov theory – Design of model reference adaptive controller using MIT rule and Lyapunov theory – Relation between model reference adaptive controller and self-tuning regulator.

UNIT V TUNING OF CONTROLLERS AND CASE STUDIES 6+6 Design of gain scheduling controller - Auto-tuning of PID regulator – Stability analysis of adaptive controllers – Application of adaptive control in chemical reactor, distillation column and variable area tank system.

TOTAL : 60 PERIODS

COURSE OUTCOMES

Understand the effect of parameter variation and principle of adaptive control schemes.
Distinguish different parametric identification methods.
Understand Deterministic and Stochastic Self Tuning Regulators.
Design of model reference adaptive controller
Design gain scheduling controller and apply adaptive control schemes for industrial processes.

TEXT BOOKS:

Karl J. Astrom & Bjorn Wittenmark, 'Adaptive Control', Pearson Education (Singapore), Second Edition, 2003.
Shankar Sastry and Marc Bodson, 'Adaptive Control: Stability, Convergence, and Robustness', Prentice-Hall, 1994.
I. D. Landau, R. Lozano, and M. M'Saad, 'Adaptive Control', NY: Springer-Verlag, 1998.

REFERENCES:

Chalam, 'Adaptive Control Systems: Techniques and Applications', CRC Press, 1987.
Landau, I.D., Lozano, R., M'Saad, M., Karimi, A, 'Adaptive Control Algorithms, Analysis and Applications', 2nd edition, Springer, 2011

T. C.H.A. Hsia, 'System Identification', Lexington books, 1974.
Stephanopoulis G. 'Chemical Process Control', Prentice Hall of India, New Delhi, 1990.
Miroslav Krstic, Ioannis Kanellakopoulos, Petar V. Kokotovic, 'Nonlinear and Adaptive Control Design', 1st Edition, Wiley, 1995.
Gang Tao, 'Adaptive Control Design and Analysis', Wiley-IEEE Press, 2003,
Kumpati S. Narendra, Anuradha M. Annaswamy, 'Stable Adaptive Control Systems', Prentice Hall, 1989.

EI8072 ADVANCED INSTRUMENTATION SYSTEMS LTPC
3003

COURSE OBJECTIVES

To make the students review the instruments used for measurement of basic process parameters like level, flow, pressure and temperature.
To explore the various types of analyzers used in industrial applications.
To make the students to understand the requirement of safety instrumented system, standards and risk analysis techniques
To make students familiarize with Instrumentation standards such as BS1042, ISA 75, ISA 84 and ISA 88.
To make students familiarize with Instrumentation Symbols, Abbreviations and Identification for Instruments, Process Flow diagrams, Instrument Loop diagrams, Instrument Hookup diagrams and Piping and Instrumentation Diagrams.

UNIT I MEASUREMENT OF PROCESS PARAMETERS 9
Review the various Measurement techniques of temperature, pressure, flow and level – application - selection of sensors– calibration methods.

UNIT II INSTRUMENTS FOR ANALYSIS 9
Ion selective electrodes : Gas & Liquid Chromatography - Oxygen analyzers for gas and liquid – CO, CO2, NO and SO Analyzers- Hydrocarbon and HS Analyzers – Dust Analyzers, smoke Analyzers, Toxic gas Analyzers and radiation monitoring.

UNIT III SAFETY INSTRUMENTATION 9
Introduction to Safety Instrumented Systems – Hazards and Risk – Process Hazards Analysis (PHA) – Safety Life Cycle – Control and Safety Systems - Safety Instrumented Function - Safety Integrity Level (SIL) – Selection, Verification and Validation.

UNIT IV INSTRUMENTATION STANDARDS 9
Instrumentation Standards - significance of codes and standards – overview of various types - Introduction of various Instrumentation standards – review, interpretation and significance of specific standards - examples of usage of standards on specific applications.

UNIT V DOCUMENTATION IN PROCESS INDUSTRIES 9
Block Diagram of a Typical Process – Instrumentation Symbols, Abbreviations and Identification for Instruments: - Mechanical Equipment, Electrical Equipment, Instruments and Automation Systems - Process Flow Diagram (PFD) – Piping and Instrumentation Diagram (P&ID) -Instrument Lists and Specification – Logic Diagrams – Instrument Loop Diagrams - Instrument Hookup Diagrams – Location Plans for Instruments - Cable Routing Diagrams – Typical Control / Rack Rooms Layout – Vendors Documents and Drawings

TOTAL: 45 PERIODS

COURSE OUTCOMES

Students will be able to

understand the instrumentation behind flow, level, temperature and pressure measurement

Acquire basic knowledge on the various types of analyzers used in typical industries.

Understand the role of Safety instrumented system in the industry.

Explain Standards for applying Instrumentation in Hazards Locations.

Design, develop, and interpret the documents used to define instruments and control Systems for a typical project, including P&IDs, loop diagrams, specification forms, Instrument lists, logic diagrams, installation details, and location plans

TEXT BOOKS

B.G.Liptak, "Instrumentation Engineers Handbook (Process Measurement & Analysis)", Fourth Edition, Chilton Book Co, CRC Press, 2005.

REFERENCE BOOKS

Swapan Basu, "Plant Hazard analysis and Safety Instrumentation systems" Academic Press, 2016

Al.Sutko,Jerry.D.Faulk, "Industrial Instrumentation", Delmar publishers, 1996.

Paul Gruhn, P.E., CFSE and Harry Cheddie, P.E., "Safety Instrumented Systems: Design, Analysis, and Justification", 2nd Edition, ISA 2006.

Safety - ANSI/ISA84.00.01-2004, Part 1: Framework, Definitions, System Hardware and Software Requirements; ANSI/ISA84.00.01-2004, Part 2: Functional Safety: Safety Instrumented Systems for the Process Industry Sector; ANSI/ISA84.00.01-2004, Part 3: Guidance for the Determination of the Required Safety Integrity Levels-Informative.

Standards - ANSI/ISA-75.01.01 -2002 (60534-2-1 Mod): Flow Equations for Sizing control Valves; ISA84 Process Safety Standards and User Resources, Second Edition, ISA, 2011; ISA88 Batch Standards and User Resources, 4th Edition, ISA, 2011.

Documentation Standards - ANSI/ISA5.4-1991 - Instrument Loop Diagrams; ANSI/ISA5.06.01-2007 - Functional Requirements Documentation for Control Software Applications; ANSI/ISA20-1981 - Specification Forms for Process Measurement and Control Instruments, Primary Elements, and Control Valves.

EE8071 APPLIED SOFT COMPUTING LTPC 3003

OBJECTIVES:

To expose the students to the concepts of feed forward neural networks.

To provide adequate knowledge about feedback neural networks

To provide adequate knowledge about fuzzy and neuro-fuuzy systems

To provide comprehensive knowledge of fuzzy logic control to real time systems.

To provide adequate knowledge of genetic algorithms and its application to economic dispatch and unit commitment problems.

UNIT I ARCHITECTURES – ANN 9

Introduction – Biological neuron – Artificial neuron – Neuron model – Supervised and unsupervised learning- Single layer – Multi layer feed forward network – Learning algorithm-Back propagation network.

UNIT II NEURAL NETWORKS FOR CONTROL 9

Feedback networks – Discrete time Hopfield networks – Transient response of continuous time system – Applications of artificial neural network - Process identification – Neuro controller for inverted pendulum.

UNIT III FUZZY SYSTEMS 9

Classical sets – Fuzzy sets – Fuzzy relations – Fuzzification – Defuzzification – Fuzzy rules - Membership function – Knowledge base – Decision-making logic – Introduction to neuro fuzzy system- Adaptive fuzzy system.

UNIT IV APPLICATION OF FUZZY LOGIC SYSTEMS 9

Fuzzy logic control: Home heating system - liquid level control - aircraft landing- inverted pendulum – fuzzy PID control, Fuzzy based motor control.

UNIT V GENETIC ALGORITHMS 9

Basic concept of Genetic algorithm and detail algorithmic steps-adjustment of free Parameters- Solution of typical control problems using genetic algorithm - Concept on some other search techniques like tabu search and ant colony search techniques for solving optimization problems.

TOTAL: 45 PERIODS

OUTCOMES:

Ability to understand and apply basic science, circuit theory, Electro-magnetic field theory control theory and apply them to electrical engineering problems.

To understand and apply computing platform and software for engineering problems.

TEXT BOOKS:

Laurance Fausett, Englewood Cliffs, N.J., 'Fundamentals of Neural Networks', Pearson Education, 1992.

Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', Tata McGraw Hill, 3rd Edition , 2010..

S.N.Sivanandam and S.N.Deepa, Principles of Soft computing, Wiley India Edition, 2nd Edition, 2013

Simon Haykin, 'Neural Networks', Pearson Education, 2003.

John Yen & Reza Langari, 'Fuzzy Logic – Intelligence Control & Information', Pearson Education, New Delhi, 2003.

M.Gen and R,Cheng, Genetic algorithms and optimization, Wiley Series in Engineering Design and Automation, 2000.

Hagan, Demuth, Beale, " Neural Network Design", Cengage Learning, 2012.

N.P.Padhy, " Artificial Intelligence and Intelligent Systems", Oxford, 2013.

William S.Levine, "Control System Advanced Methods," The Control Handbook CRC Press 2011.

EI8075 FIBRE OPTICS AND LASER INSTRUMENTS LTPC 3003

AIM:

To contribute to the knowledge of Fibre optics and Laser Instrumentation and its Industrial and Medical Application.

COURSE OBJECTIVES

To expose the students to the basic concepts of optical fibres and their properties. To provide adequate knowledge about the Industrial applications of optical fibres. To expose the students to the Laser fundamentals.

To provide adequate knowledge about Industrial application of lasers.

To provide adequate knowledge about holography and Medical applications of Lasers.

UNIT I OPTICAL FIBRES AND THEIR PROPERTIES 9

Construction of optical fiber cable: Guiding mechanism in optical fiber and Basic component of optical fiber communication, –Principles of light propagation through a fibre: Total internal reflection, Acceptance angle (θa), Numerical aperture and Skew mode, –Different types of fibres and their properties: Single and multimode fibers and Step index and graded index fibers,– fibrecharacteristics: Mechanical characteristics and Transmission characteristics, – Absorption losses – Scattering losses – Dispersion – Connectors and splicers –Fibre termination – Optical sources: Light Emitting Diode (LED), – Optical detectors: PIN Diode.

UNIT II INDUSTRIAL APPLICATION OF OPTICAL FIBRES 9

Fibre optic sensors: Types of fiber optics sensor, Intrinsic sensor- Temperature/ Pressure sensor, Extrinsic sensors, Phase Modulated Fibre Optic Sensor and Displacementsensor (Extrinsic Sensor) – Fibre optic instrumentation system: Measurement of attenuation (by cut back method), Optical domain reflectometers, Fiber Scattering loss Measurement, Fiber Absorption Measurement, Fiber dispersion measurements, End reflection method and Near field scanning techniques – Different types of modulators: Electro-optic modulator (EOM) –Interferometric method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain.

UNIT III LASER FUNDAMENTALS 9

Fundamental characteristics of lasers – Level Lasers: Two-Level Laser, Three Level Laser, Quasi Three and four level lasers – Properties of laser: Monochromaticity, Coherence, Divergence and Directionality and Brightness –Laser modes – Resonator configuration – Q-switching and mode locking – Cavity damping – Types of lasers; – Gas lasers, solid lasers, liquid lasers and semiconductor lasers.

UNIT IV INDUSTRIAL APPLICATION OF LASERS 9

Laser for measurement of distance, Laser for measurement of length, Laser for measurement of velocity, Laser for measurement of acceleration, Laser for measurement of current, voltage and Laser for measurement of Atmospheric Effect: Types of LIDAR, Construction And Working, and LIDAR Applications – Material processing: Laser instrumentation for material processing, Powder Feeder, Laser Heating, Laser Welding, Laser Melting, Conduction Limited Melting and Key Hole Melting – Laser trimming of material: Process Of Laser Trimming, Types Of Trim, Construction And Working Advantages – Material Removal and vaporization: Process Of Material Removal.

UNIT V HOLOGRAM AND MEDICAL APPLICATIONS 9

Holography: Basic Principle, Holography vs. photography, Principle Of Hologram Recording, Condition For Recording A Hologram, Reconstructing and viewing the holographic image– Holography for non-destructive testing – Holographic components – Medical applications of lasers, laser-Tissue Interactions Photochemical reactions, Thermalisation, collisional relaxation, Types of

Interactions and Selecting an Interaction Mechanism – Laser instruments for surgery, removal of tumors of vocal cards, brain surgery, plastic surgery, gynaecology and oncology.

TOTAL : 45 PERIODS

COURSE OUTCOMES (COs):

Understand the principle, transmission, dispersion and attenuation characteristics of opticalfibers

Apply the gained knowledge on optical fibers for its use as communication medium and as sensor as well which have important applications in production, manufacturing industrial and biomedical applications.

Understand laser theory and laser generation system.

Students will gain ability to apply laser theory for the selection of lasers for a specific Industrial and medical application.

TEXT BOOKS:

J.M. Senior, 'Optical Fibre Communication – Principles and Practice', Prentice Hall of India,1985.

J. Wilson and J.F.B. Hawkes, 'Introduction to Opto Electronics', Prentice Hall of India, 2001.

Eric Udd, William B., and Spillman, Jr., "Fiber Optic Sensors: An Introduction for Engineers and Scientists ", John Wiley & Sons, 2011.

REFERENCES:

G. Keiser, 'Optical Fibre Communication', McGraw Hill, 1995.

M. Arumugam, 'Optical Fibre Communication and Sensors', Anuradha Agencies, 2002.

John F. Ready, "Industrial Applications of Lasers", Academic Press, Digitized in 2008.

Monte Ross, 'Laser Applications', McGraw Hill, 1968.

John and Harry, "Industrial lasers and their application", McGraw-Hill, 2002.

Keiser, G., "Optical Fiber Communication", McGraw-Hill, 3rd Edition, 2000. http://nptel.ac.in/courses/117101002/

EE8391 ELECTROMAGNETIC THEORY L T P C 2203

OBJECTIVES:

To introduce the basic mathematical concepts related to electromagnetic vector fields To impart knowledge on the concepts of

Electrostatic fields, electrical potential, energy density and their applications.

Magneto static fields, magnetic flux density, vector potential and its applications. Different methods of emf generation and Maxwell's equations

Electromagnetic waves and characterizing parameters

UNIT I ELECTROSTATICS – I 6+6

Sources and effects of electromagnetic fields – Coordinate Systems – Vector fields – Gradient, Divergence, Curl – theorems and applications - Coulomb's Law – Electric field intensity – Field due to discrete and continuous charges – Gauss's law and applications.

UNIT II ELECTROSTATICS – II 6+6 Electric potential – Electric field and equipotential plots, Uniform and Non-Uniform field,

Utilization factor – Electric field in free space, conductors, dielectrics - Dielectric polarization – Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson's and

Laplace's equations, Capacitance, Energy density, Applications.

UNIT III MAGNETOSTATICS 6+6

Lorentz force, magnetic field intensity (H) – Biot–Savart's Law - Ampere's Circuit Law – H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization, Magnetic field in multiple media – Boundary conditions, scalar and vector potential, Poisson's Equation, Magnetic force, Torque, Inductance, Energy density, Applications.

UNIT IV ELECTRODYNAMIC FIELDS 6+6

Magnetic Circuits - Faraday's law – Transformer and motional EMF – Displacement current - Maxwell's equations (differential and integral form) – Relation between field theory and circuit theory – Applications.

UNIT V ELECTROMAGNETIC WAVES 6+6

Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors- skin depth - Poynting vector – Plane wave reflection and refraction.

TOTAL : 60 PERIODS

OUTCOMES:

Ability to understand the basic mathematical concepts related to electromagnetic vector fields.

Ability to understand the basic concepts about electrostatic fields, electrical potential, energy density and their applications.

Ability to acquire the knowledge in magneto static fields, magnetic flux density, vector potential and its applications.

Ability to understand the different methods of emf generation and Maxwell's equations

Ability to understand the basic concepts electromagnetic waves and characterizing parameters

Ability to understand and compute Electromagnetic fields and apply them for design and analysis of electrical equipment and systems

TEXT BOOKS:

Mathew N. O. Sadiku, 'Principles of Electromagnetics', 6th Edition, Oxford University Press Inc. Asian edition, 2015.

William H. Hayt and John A. Buck, 'Engineering Electromagnetics', McGraw Hill Special Indian edition, 2014.

Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 2010.

REFERENCES

V.V.Sarwate, 'Electromagnetic fields and waves', First Edition, Newage Publishers, 1993.

J.P.Tewari, 'Engineering Electromagnetics - Theory, Problems and Applications', Second Edition, Khanna Publishers.

Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Third Edition (Schaum's Outline Series), McGraw Hill, 2010.

S.P.Ghosh, Lipika Datta, 'Electromagnetic Field Theory', First Edition, McGraw Hill Education(India) Private Limited, 2012.

K A Gangadhar, 'Electromagnetic Field Theory', Khanna Publishers; Eighth Reprint : 2015

GE8071 DISASTER MANAGEMENT LTPC
3003

OBJECTIVES:

To provide students an exposure to disasters, their significance and types.
To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR) To enhance awareness of institutional processes in the country and
To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9 Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to
Differentiate the types of disasters, causes and their impact on environment and society

Assess vulnerability and various methods of risk reduction measures as well as mitigation.
Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

TEXTBOOKS:

Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]
Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES

Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
Government of India, National Disaster Management Policy,2009.

GE8074 HUMAN RIGHTS LTPC
3003

OBJECTIVES :
To sensitize the Engineering students to various aspects of Human Rights.

UNIT I **9**
Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II **9**
Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III **9**
Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV **9**
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**
Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

OUTCOME :
Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.

Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.

Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

MG8491	OPERATIONS RESEARCH	L	T	P	C
		30		0	3

OBJECTIVES:

To provide knowledge and training in using optimization techniques under limited resources for the engineering and business problems.

UNIT I LINEAR MODELS 15

The phase of an operation research study – Linear programming – Graphical method– Simplex algorithm – Duality formulation – Sensitivity analysis.

UNIT II TRANSPORTATION MODELS AND NETWORK MODELS 8

Transportation Assignment Models –Traveling Salesman problem- Networks models – Shortest route – Minimal spanning tree – Maximum flow models –Project network – CPM and PERT networks – Critical path scheduling – Sequencing models.

UNIT III INVENTORY MODELS 6

Inventory models – Economic order quantity models – Quantity discount models – Stochastic inventory models – Multi product models – Inventory control models in practice.

UNIT IV QUEUEING MODELS 6

Queueing models - Queueing systems and structures – Notation parameter – Single server and multi server models – Poisson input – Exponential service – Constant rate service – Infinite population – Simulation.

UNIT V DECISION MODELS 10

Decision models – Game theory – Two person zero sum games – Graphical solution- Algebraic solution– Linear Programming solution – Replacement models – Models based on service life – Economic life– Single / Multi variable search technique – Dynamic Programming – Simple Problem.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the students can able to use the optimization techniques for use engineering and Business problems

TEXT BOOK:

Hillier and Libeberman, "Operations Research", Holden Day, 2005

Taha H.A., "Operations Research", Sixth Edition, Prentice Hall of India, 2003.

REFERENCES:

Bazara M.J., Jarvis and Sherali H., "Linear Programming and Network Flows", John Wiley, 2009.

Budnick F.S., "Principles of Operations Research for Management", Richard D Irwin, 1990.

Philip D.T. and Ravindran A., "Operations Research", John Wiley, 1992.

Shennoy G.V. and Srivastava U.K., "Operation Research for Management", Wiley Eastern, 1994.

Tulsian and Pasdey V., "Quantitative Techniques", Pearson Asia, 2002.

GE8072	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- **To understand the global trends and development methodologies of various types of products and services**
- **To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems**
- **To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification**
- **To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics**
- **To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer**

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision - Social Trends - Technical Trends-Economical Trends - Environmental Trends - Political/Policy Trends - Introduction to Product Development Methodologies and Management - Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies

Product Life Cycle – Product Development Planning and Management.

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9

Requirement Engineering - Types of Requirements - Requirement Engineering - traceability Matrix and Analysis - Requirement Management - System Design & Modeling - Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design.

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – Challenges in Integration of Engineering Disciplines - Concept Screening & Evaluation - Detailed Design - Component Design and Verification – Mechanical, Electronics and Software Subsystems - High Level Design/Low Level Design of S/W Program - Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – Prototyping - Introduction to Rapid Prototyping and Rapid Manufacturing - System Integration, Testing, Certification and Documentation

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product Validation processes and stages - Product Testing Standards and Certification - Product Documentation Sustenance -Maintenance and Repair – Enhancements - Product EoL - Obsolescence Management – Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product Development in Industry versus Academia –The IPD Essentials - Introduction to Vertical Specific Product Development processes -Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and Software Systems – Product Development Trade-offs - Intellectual Property Rights and Confidentiality – Security and Configuration Management.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- **Define, formulate and analyze a problem**
- **Solve specific problems independently or as part of a team**
- **Gain knowledge of the Innovation & Product Development process in the Business Context**
- **Work independently as well as in teams**
- **Manage a project from start to finish**

TEXTBOOKS:

- **Book specially prepared by NASSCOM as per the MoU.**
- **Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, Fifth Edition, 2011.**
- **John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill, Eleventh Edition, 2005.**

REFERENCES:

- **Hiriyappa B, "Corporate Strategy – Managing the Business", Author House, 2013.**
- **Peter F Drucker, "People and Performance", Butterworth – Heinemann [Elsevier], Oxford, 2004.**
- **Vinod Kumar Garg and Venkita Krishnan N K, "Enterprise Resource Planning – Concepts", Second Edition, Prentice Hall, 2003.**
- **Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, Seventh Edition, 2013**

EI8691 COMPUTER CONTROL OF PROCESSES LTPC
3003

COURSE OBJECTIVES

To represent the linear time invariant System in discrete State Space form.
To analyze the controllability, observability and stability of a Discrete time System.
To estimate model parameters from input/output measurements To Design Digital Controllers
To Design Multi-loop and Multivariable Controllers for multivariable system

UNIT I DISCRETE STATE-VARIABLE TECHNIQUE 9

State equation of discrete data system with sample and hold – State transition equation – Methods of computing the state transition matrix – Decomposition of discrete data transfer functions – State diagrams of discrete data systems – System with zero-order hold – Controllability and observability of linear time invariant discrete data system– Stability tests of discrete-data system.

UNIT II SYSTEM IDENTIFICATION 9

Identification of Non Parametric Input-Output Models:-Transient analysis–Frequency analysis– Correlation analysis– Spectral analysis – Identification of Parametric Input-Output Models:-Least Squares Method – Recursive Least Square Method.

UNIT III DIGITAL CONTROLLER DESIGN 9

Review of z-transform – Modified of z-transform – Pulse transfer function – Digital PID controller – Dead-beat controller and Dahlin's controller – IMC - Smith Predictor.

UNIT IV MULTI-LOOP REGULATORY CONTROL 9

Multi-loop Control - Introduction – Process Interaction – Pairing of Inputs and Outputs – The Relative Gain Array (RGA) – Properties and Application of RGA - Multi-loop PID Controller – Biggest Log Modulus Tuning Method – De-coupler.

UNIT V MULTIVARIABLE REGULATORY CONTROL 9

Introduction to Multivariable control –Multivariable PID Controller – Multivariable Dynamic Matrix Controller – Fuzzy Logic Controller – Case Studies:- Distillation Column, CSTR and Four-tank system.

TOTAL : 45 PERIODS

COURSE OUTCOMES (COs)

Ability to analyze the discrete time systems
Ability to build models from input-output data
Ability to design a digital controller
Ability to design multi-loop controller and multivariable controller for multi-variable systems.

TEXT BOOKS:

Stephanopoulos, G., "Chemical Process Control -An Introduction to Theory and Practice", Prentice Hall of India, 2005.
Sigurd Skogestad, Ian Postlethwaite, "Multivariable Feedback Control: Analysis and Design", John Wiley and Sons, 2005.

REFERENCES:

Gopal, M., "Digital Control and State Variable Methods", Tata Mc Graw Hill, 2003.

Dale E. Seborg, Duncan A. Mellichamp, Thomas F. Edgar, "Process Dynamics and Control", Wiley John and Sons, 3rd Edition, 2010.

P. Albertos and A. Sala, "Multivariable Control Systems An Engineering Approach", Springer Verlag, 2006.

Bequette, B.W., "Process Control Modeling, Design and Simulation", Prentice Hall of India, 2008.

Thomas E. Marlin, Process Control – Designing Processes and Control systems for Dynamic Performance, Mc-Graw-Hill,2000.

EI8692 ELECTRONIC INSTRUMENTATION LTPC

3003

COURSE OBJECTIVES

To introduce different types of electronic voltmeters and their applications.

To provide knowledge on various types of cathode ray oscilloscopes, their applications and different types of signal analyzers.

To introduce different types of waveform generators and analyzers and their applications.

To educate on virtual instrumentation, its applications, programming and DAQ cards and modules.

To give exposure to telemetry, modulation techniques and multiplexing.

UNIT I ELECTRONIC INSTRUMENTS 9

Electronic Voltmeter and their advantages – Types, Differential amplifier, source follower, rectifier – Truerms reading voltmeter – Electronic multimeter and ohmmeter – Current measurement – Power measurement - Microprocessor based DMM with auto ranging and self diagnostic features.

UNIT II CATHODE RAY OSCILLOSCOPE & SIGNAL ANALYZERS 9

General purpose cathode ray oscilloscope – Dual trace, dual beam and sampling oscilloscopes– Analog and digital storage oscilloscope - frequency selective and heterodyne wave analyzer – Harmonic distortion analyzer – Spectrum analyzer.

UNIT III WAVEFORM GENERATORS 9

Wien's bridge and phase shift oscillators – Hartley and crystal oscillators – Square wave and pulse generators – Triangular wave-shape generator - Signal and function generators – Q meter – Electronic Counters.

UNIT IV VIRTUAL INSTRUMENTATION 9

Virtual instrumentation (VI) – Definition, flexibility – Block diagram and architecture of virtual instruments – Virtual instruments versus traditional instruments – Software in virtual instrumentation - VI programming techniques – DAQ cards for VI applications – DAQ modules with serial communication.

UNIT V TELEMETRY **9**

General telemetry system – voltage, current and position telemetry systems – Radio frequency telemetry – Frequency modulation, pulse-amplitude modulation and pulse-code modulation telemetry – Frequency and time multiplexing.

TOTAL : 45 PERIODS

COURSE OUTCOMES (COs)

Ability to understand and analyze Instrumentation systems and their applications to various industries.

TEXT BOOKS:

A.D. Helfrick and W.D. Cooper, Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall India Private Ltd., New Delhi, 2010.

David A Bell, " Electronic Instrumentation and Measurements", Ox for University Press, 2013.

Jerome J., Virtual Instrumentation using Lab VIEW, Prentice Hall India Private Ltd., New Delhi,2010.

REFERENCES:

H.S. Kalsi, Electronic Instrumentation, Tata McGraw-Hill, New Delhi, 2010.

J.J. Carr, Elements of Electronic Instrumentation and Measurement, Pearson Education India, New Delhi, 2011.

M.M.S. Anand, Electronics Instruments and Instrumentation Technology, Prentice Hall India, New Delhi, 2009.

Sanjay Gupta, Virtual Instrumentation using Lab view, Tata McGraw-Hill Education, 2010.

EI8076 OPTIMAL CONTROL LTPC

2 2 0 3

OBJECTIVES:

To understand the optimal control concepts and its importance

To study the important optimal control methods existing in the industries in order obtain the required level of control

To introduce the concept of optimal control in various system

To help the learners in the design and the implementation of the concept of optimal control To study, analyze and implement discrete-Time optimal control system

UNIT I INTRODUCTION **6+6**

Introduction to Optimal control – Comparison between the Conventional control and optimal control procedures - Statement of optimal control problem – Problem formulation and forms of optimal Control – Selection of performance measures. Necessary conditions for optimal control.

UNIT II MATHEMATICAL EVALUATION **6+6**

Introduction and Performance Index - Basic Concept of calculus of variation- The basic variational problem - Fixed end point problem - Free end point problem - Variational Approach to Optimal Control Systems.

UNIT III CONTROL STRATEGY 6+6

Introduction - Time varying optimal control – LQR steady state optimal control – Frequency Domain Interpretation of LQR (LTI system) - Solution of Ricatti'sequation – Application examples.

UNIT IV PROBLEM FORMATION 6+6

Optimal Control: Introduction, formation of optimal control problem, calculus of variations minimization of functions, constrained optimization. Pontryagin's Minimum/Maximum Principle, Linear Quadratic Problem-Hamilton Jacobi equation and its solution.

UNIT V ADVANCED SYSTEMS 6+6 Discrete-Time Optimal Control Systems - Matrix Discrete Riccati Equation -

Analytical Solution of Matrix Difference Riccati Equation - Optimal Control Using Dynamic Programming - The Hamilton-Jacobi-Bellman (HJB) Equation - LQR System HJB Equation-Time Optimal Control System.

TOTAL : 60 PERIODS

OUTCOMES:

- **Problem formulation, forms of optimal control and its necessary conditions.**
- **Solving the algebraic equations to design the controller and to study about various problems**
- **Designing optimal controllers using a class of procedures**
- **Predict the system dynamic behavior through solution of ODEs and formation of optimal control problem**
- **Solve equations to design the controllers in discrete methods representing spatial and temporal variations in physical systems through numerical methods.**
- **Implementing the Optimal control methodology for the benchmark /real time systems.**

TEXT BOOKS:

- **Kirk, D.E., Optimal Control Theory, Dover Publications, 2004.**
- **D.S.Naidu, "Optimal Control Systems" First Indian Reprint, CRC Press, 2009.**
- **Astrom, K.J. Intro. Stochastic Control Theory, Dover Publications, 2006.**

REFERENCES:

- **Gopal M, "Digital Control and State Variable Methods," Tata McGraw-Hill**
- **F.L.Lewis,OptimalControl,JohnWiley&Sons,Inc.,NewYork,NY,1986**
- **M.Gopal,ModernControlSystemTheory,NewAgeInternational**
- **SageA.P.&WhiteC.C.,Optimum Systems Control, PrenticeHall**
- **http://nptel.ac.in/courses/108105019/**

TL8071 RADAR AND NAVIGATIONAL AIDS L T P C 3003

OBJECTIVES:

- **To apply Doppler principle to radars and hence detect moving targets, cluster, also to understand tracking radars**
- **To refresh principles of antennas and propagation as related to radars, also study of transmitters and receivers.**
- **To understand principles of navigation, in addition to approach and landing aids as related to navigation**

UNIT I INTRODUCTION TO RADAR EQUATION 9

Introduction- Basic Radar –The simple form of the Radar Equation- Radar Block Diagram- Radar

Frequencies –Applications of Radar – The Origins of Radar - Detection of Signals in Noise- Receiver Noise and the Signal-to-Noise Ratio-Probability Density Functions- Probabilities of Detection and False Alarm- Integration of Radar Pulses- Radar Cross Section of Targets- Radar cross Section Fluctuations- Transmitter Power-Pulse Repetition Frequency- Antenna Parameters-System losses – Other Radar Equation Considerations.

UNIT II MTI AND PULSE DOPPLER RADAR 9

Introduction to Doppler and MTI Radar- Delay –Line Cancellers- Staggered Pulse Repetition Frequencies –Doppler Filter Banks - Digital MTI Processing - Moving Target Detector - Limitations to MTI Performance - MTI from a Moving Platform (AMIT) – Pulse Doppler Radar – Other Doppler Radar Topics- Tracking with Radar –Monopulse Tracking –Conical Scan and Sequential Lobing - Limitations to Tracking Accuracy - Low-Angle Tracking - Tracking in Range - Other Tracking Radar Topics - Comparison of Trackers - Automatic Tracking with Surveillance Radars (ADT).

UNIT III DETECTION OF SIGNALS IN NOISE 9

Matched –Filter Receiver –Detection Criteria – Detectors –-Automatic Detector - Integrators - Constant-False- Alarm Rate Receivers - The Radar operator - Signal Management - Propagation Radar Waves - Atmospheric Refraction -Standard propagation - Nonstandard Propagation - The Radar Antenna - Reflector Antennas - Electronically Steered Phased Array Antennas – Phase Shifters - Frequency-Scan Arrays

Radar Transmitters and Receivers - Introduction –Linear Beam Power Tubes - Solid State RF Power Sources - Magnetron - Crossed Field Amplifiers - Other RF Power Sources – Other aspects of Radar Transmitter.- The Radar Receiver - Receiver noise Figure – Super heterodyne Receiver - Duplexers and Receiver Protectors- Radar Displays.

UNIT IV RADIO DIRECTION AND RANGES 9

Introduction - Four methods of Navigation .- The Loop Antenna - Loop Input Circuits - An Aural Null Direction Finder - The Goniometer - Errors in Direction Finding - Adcock Direction Finders - Direction Finding at Very High Frequencies - Automatic Direction Finders – The Commutated Aerial Direction Finder - Range and Accuracy of Direction Finders - The LF/MF Four course Radio Range - VHF Omni Directional Range(VOR) - VOR Receiving Equipment - Range and Accuracy of VOR – Recent Developments.

Hyperbolic Systems of Navigation (Loran and Decca) - Loran-A - Loran-A Equipment - Range and precision of Standard Loran - Loran-C - The Decca Navigation System -Decca Receivers - Range and Accuracy of Decca - The Omega System.

UNIT VSATELLITE NAVIGATION SYSTEM 9

Distance Measuring Equipment - Operation of DME - TACAN - TACAN Equipment - Instrument Landing System - Ground Controlled Approach System - Microwave Landing System(MLS) The Doppler Effect - Beam Configurations -Doppler Frequency Equations - Track Stabilization - Doppler Spectrum - Components of the Doppler Navigation System - Doppler range Equation - Accuracy of Doppler Navigation Systems. Inertial Navigation - Principles of Operation - Navigation Over the Earth– Components of an Inertial Navigation System - Earth Coordinate Mechanization - Strapped-Down Systems - Accuracy of Inertial Navigation Systems-The Transit System - Navstar Global Positioning System (GPS).

TOTAL: 45 PERIODS

OUTCOMES:

After studying this course, Students will be able to

- **Explain principles of navigation, in addition to approach and landing aids as related to navigation**
- **Derive and discuss the Range equation and the nature of detection.**
- **Describe about the navigation systems using the satellite.**

TEXT BOOKS:

Merrill I. Skolnik ," Introduction to Radar Systems", 3rd Edition Tata Mc Graw-Hill 2003.. (For unit-1&2)

N.S.Nagaraja, "Elements of Electronic Navigation Systems", 2nd Edition, TMH, 2000. (For unit-3,4&5)

REFERENCES

Peyton Z. Peebles:, "Radar Principles", John Wiley, 2004

J.C Toomay, " Principles of Radar", 2nd Edition –PHI, 2004

GE8077 TOTAL QUALITY MANAGEMENT L T P C

3 0 0 3

OBJECTIVE:

To facilitate the understanding of Quality Management principles and process.

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.

UNIT II TQM PRINCIPLES 9

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I 9

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II 9

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM 9

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation—Documentation—Internal Audits—Registration--ENVIRONMENTAL MANAGEMENT SYSTEM: Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001— Benefits of EMS.

TOTAL: 45 PERIODS

OUTCOME:

The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXT BOOK:

Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, "Total Quality Management", Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

REFERENCES:

1. **James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.**
   Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
   Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
   ISO9001-2015 standards

EC8095 VLSI DESIGN L T P C 3003

OBJECTIVES:

- **Study the fundamentals of CMOS circuits and its characteristics.**
- **Learn the design and realization of combinational & sequential digital circuits.**
  - **Architectural choices and performance tradeoffs involved in designing and realizing the circuits in CMOS technology are discussed**
- **Learn the different FPGA architectures and testability of VLSI circuits.**

UNIT I INTRODUCTION TO MOS TRANSISTOR 9

MOS Transistor, CMOS logic, Inverter, Pass Transistor, Transmission gate, Layout Design Rules, Gate Layouts, Stick Diagrams, Long-Channel I-V Charters tics, C-V Charters tics, Nonideal I-V Effects, DC Transfer characteristics, RC Delay Model, Elmore Delay, Linear Delay Model, Logical effort, Parasitic Delay, Delay in Logic Gate, Scaling.

UNIT II COMBINATIONAL MOS LOGIC CIRCUITS 9

Circuit Families: Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass Transistor Logic, Transmission Gates, Domino, Dual Rail Domino, CPL, DCVSPG, DPL, Circuit Pitfalls.

Power: Dynamic Power, Static Power, Low Power Architecture.

UNIT III SEQUENTIAL CIRCUIT DESIGN 9

Static latches and Registers, Dynamic latches and Registers, Pulse Registers, Sense Amplifier Based Register, Pipelining, Schmmit Trigger, Monostable Sequential Circuits, Astable Sequential Circuits.

Timing Issues : Timing Classification Of Digital System, Synchronous Design.

UNIT IV DESIGN OF ARITHMETIC BUILDING BLOCKS AND SUBSYSTEM 9

Arithmetic Building Blocks: Data Paths, Adders, Multipliers, Shifters, ALUs, power and speed tradeoffs, Case Study: Design as a tradeoff.

Designing Memory and Array structures: Memory Architectures and Building Blocks, Memory Core, Memory Peripheral Circuitry.

UNIT V IMPLEMENTATION STRATEGIES AND TESTING 9

FPGA Building Block Architectures, FPGA Interconnect Routing Procedures.
Design for Testability: Ad Hoc Testing, Scan Design, BIST, IDDQ Testing, Design for Manufacturability, Boundary Scan.

TOTAL : 45 PERIODS

OUTCOMES:

UPON COMPLETION OF THE COURSE, STUDENTS SHOULD ABLE TO

- **Realize the concepts of digital building blocks using MOS transistor.**
- **Design combinational MOS circuits and power strategies.**
- **Design and construct Sequential Circuits and Timing systems.**
- **Design arithmetic building blocks and memory subsystems.**
- **Apply and implement FPGA design flow and testing.**

TEXT BOOKS:

Neil H.E. Weste, David Money Harris "CMOS VLSI Design: A Circuits and Systems Perspective", 4th Edition, Pearson , 2017.(UNIT I,II,V)

Jan M. Rabaey ,Anantha Chandrakasan, Borivoje. Nikolic, "Digital Integrated Circuits:A Design perspective", Second Edition , Pearson , 2016. . (UNIT III,IV)

REFERENCES

M.J. Smith, "Application Specific Integrated Circuits", Addisson Wesley, 1997

Sung-Mo kang, Yusuf leblebici, Chulwoo Kim "CMOS Digital Integrated Circuits:Analysis & Design",4th edition McGraw Hill Education,2013

Wayne Wolf, "Modern VLSI Design: System On Chip", Pearson Education, 2007

R.Jacob Baker, Harry W.LI., David E.Boyee, "CMOS Circuit Design, Layout and Simulation", Prentice Hall of India 2005.

		L	T	P	C
EE8691	**EMBEDDED SYSTEMS**	**3**	**0**	**0**	**3**

OBJECTIVES:

To impart knowledge on the following Topics

Building Blocks of Embedded System

Various Embedded Development Strategies

Bus Communication in processors, Input/output interfacing. Various processor scheduling algorithms.

Basics of Real time operating system and example tutorials to discuss on one real time operating system tool.

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9

Introduction to Embedded Systems –Structural units in Embedded processor , selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging.

UNIT II EMBEDDED NETWORKING 9

Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols RS232 standard – RS422 – RS 485 - CAN Bus -Serial Peripheral Interface (SPI) – Inter

Integrated Circuits (I^2C) –need for device drivers.

UNIT III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT 9

Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model, Sequential Program Model, concurrent Model, object oriented Model.

UNIT IV RTOS BASED EMBEDDED SYSTEM DESIGN 9

Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance.

UNIT V EMBEDDED SYSTEM APPLICATION AND DEVELOPMENT 9

Case Study of Washing Machine- Automotive Application- Smart card System Application- ATM machine –Digital camera.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand and analyze Embedded systems.

Ability to suggest an embedded system for a given application.

Ability to operate various Embedded Development Strategies

Ability to study about the bus Communication in processors.

Ability to acquire knowledge on various processor scheduling algorithms.

Ability to understand basics of Real time operating system.

TEXT BOOKS:

Peckol, "Embedded system Design", John Wiley & Sons,2010

Lyla B Das," Embedded Systems-An Integrated Approach", Pearson, 2013

Shibu. K.V, "Introduction to Embedded Systems", 2e, Mc graw Hill, 2017.

REFERENCES

Raj Kamal, 'Embedded System-Architecture, Programming, Design', Mc Graw Hill, 2013.

C.R.Sarma, "Embedded Systems Engineering", University Press (India) Pvt. Ltd, 2013.

Tammy Noergaard, "Embedded Systems Architecture", Elsevier, 2006.

Han-Way Huang, "Embedded system Design Using C8051", Cengage Learning, 2009.

Rajib Mall "Real-Time systems Theory and Practice" Pearson Education, 2007.

EI8073 BIOMEDICAL INSTRUMENTATION LTPC
3 0 0 3

OBJECTIVES:

- **To Introduce Fundamentals of Biomedical Engineering**
- **To study the communication mechanics in a biomedical system with few examples**
- **To study measurement of certain important electrical and non-electrical parameters**
- **To understand the basic principles in imaging techniques**
- **To have a basic knowledge in life assisting and therapeutic devices**

UNIT I FUNDAMENTALS OF BIOMEDICAL ENGINEERING 9

Cell and its structure – Resting and Action Potential – Nervous system and its fundamentals - Basic components of a biomedical system- Cardiovascular systems- Respiratory systems - Kidney and blood flow - Biomechanics of bone - Biomechanics of soft tissues -Physiological signals and transducers - Transducers – selection criteria – Piezo electric, ultrasonic transducers - Temperature measurements - Fibre optic temperature sensors

UNIT II NON ELECTRICAL PARAMETERS MEASUREMENT AND DIAGNOSTIC PROCEDURES 9

Measurement of blood pressure - Cardiac output - Heart rate - Heart sound - Pulmonary function measurements – spirometer – Photo Plethysmography, Body Plethysmography – Blood Gas analysers, pH of blood –measurement of blood pCO2, pO2, finger-tip oxymeter - ESR, GSR measurements.

UNIT III ELECTRICAL PARAMETERS ACQUISITION AND ANALYSIS 9

Electrodes – Limb electrodes –floating electrodes – pregelled disposable electrodes - Micro, needle and surface electrodes – Amplifiers, Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier - ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms - Electrical safety in medical environment, shock hazards – leakage current-Instruments for checking safety parameters of biomedical equipment.

UNIT IV IMAGING MODALITIES AND ANALYSIS 9

Radio graphic and fluoroscopic techniques – Computer tomography – MRI – Ultrasonography – Endoscopy – Thermography –Different types of biotelemetry systems - Retinal Imaging - Imaging application in Biometric systems.

UNIT V LIFE ASSISTING, THERAPEUTIC AND ROBOTIC DEVICES 9

Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart – Lung machine – Audio meters – Dialysers – Lithotripsy - ICCU patient monitoring system - Nano Robots - Robotic surgery –Orthopedic prostheses fixation.

TOTAL : 45 PERIODS

OUTCOMES: At the end of the course students will have the

Ability to understand the philosophy of the heart, lung, blood circulation and Ability to provide latest ideas on devices of non-electrical devices. respirationsystem.

Ability to gain knowledge on various sensing and measurement devices of electrical origin. Ability to understand the analysis systems of various organ types.

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Ability to bring out the important and modern methods of imaging techniques and their analysis.

Ability to explain the medical assistance/techniques, robotic and therapeutic equipments.

TEXT BOOKS:

Leslie Cromwell, "Biomedical Instrumentation and Measurement", Prentice Hall of India, New Delhi, 2007.

Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, New Delhi,2nd edition, 2003

Joseph J Carr and John M.Brown, Introduction to Biomedical Equipment Technology, John Wiley and sons, New York, 4th edition,

2012 REFERENCES

John G. Webster, Medical Instrumentation Application and Design, John Wiley and sons, New York, 1998.

Duane Knudson, Fundamentals of Biomechanics, Springer, 2nd Edition, 2007.

Suh, Sang, Gurupur, Varadraj P., Tanik, Murat M., Health Care Systems, Technology and Techniques, Springer, 1st Edition, 2011.

Ed. Joseph D. Bronzino, The Biomedical Engineering Hand Book, Third Edition, Boca Raton, CRC Press LLC, 2006.

M.Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003.

EE8591 DIGITAL SIGNAL PROCESSING L T P C 2203

OBJECTIVES: To impart knowledge about the following topics:

Signals and systems & their mathematical representation. Discrete time systems.

Transformation techniques & their computation.

Filters and their design for digital implementation.

Programmability digital signal processor & quantization effects.

UNIT I INTRODUCTION 6+6

Classification of systems: Continuous, discrete, linear, causal, stability, dynamic, recursive, time variance; classification of signals: continuous and discrete, energy and power; mathematical representation of signals; spectral density; sampling techniques, quantization, quantization error, Nyquist rate, aliasing effect.

UNIT II DISCRETE TIME SYSTEM ANALYSIS 6+6

Z-transform and its properties, inverse z-transforms; difference equation – Solution by z-transform, application to discrete systems - Stability analysis, frequency response – Convolution – Discrete Time Fourier transform , magnitude and phase representation.

UNIT III DISCRETE FOURIER TRANSFORM & COMPUTATION 6+6

Discrete Fourier Transform- properties, magnitude and phase representation - Computation of DFT using FFT algorithm – DIT &DIF using radix 2 FFT – Butterfly structure.

UNIT IV DESIGN OF DIGITAL FILTERS 6+6

FIR & IIR filter realization – Parallel & cascade forms. FIR design: Windowing Techniques – Need and choice of windows – Linear phase characteristics. Analog filter design – Butterworth and Chebyshev approximations; IIR Filters, digital design using impulse invariant and bilinear transformation Warping, pre warping.

UNIT V DIGITAL SIGNAL PROCESSORS 6+6

Introduction – Architecture – Features – Addressing Formats – Functional modes - Introduction to Commercial DS Processors.

TOTAL : 60 PERIODS

OUTCOMES:

Ability to understand the importance of Fourier transform, digital filters and DS Processors.

Ability to acquire knowledge on Signals and systems & their mathematical representation.

Ability to understand and analyze the discrete time systems.

Ability to analyze the transformation techniques & their computation.

Ability to understand the types of filters and their design for digital implementation.

Ability to acquire knowledge on programmability digital signal processor & quantization effects.

TEXT BOOKS:

J.G. Proakis and D.G. Manolakis, 'Digital Signal Processing Principles, Algorithms and Applications', Pearson Education, New Delhi, PHI. 2003.

S.K. Mitra, 'Digital Signal Processing – A Computer Based Approach', McGraw Hill Edu, 2013.

Lonnie C.Ludeman ,"Fundamentals of Digital Signal Processing",Wiley,2013

REFERENCES

Poorna Chandra S, Sasikala. B ,Digital Signal Processing, Vijay Nicole/TMH,2013.

Robert Schilling & Sandra L.Harris, Introduction to Digital Signal Processing using Matlab", Cengage Learning,2014.

B.P.Lathi, 'Principles of Signal Processing and Linear Systems', Oxford University Press, 2010 3. Taan S. ElAli, 'Discrete Systems and Digital Signal Processing with Mat Lab', CRC Press, 2009.

SenM.kuo, woonseng…s.gan, "Digital Signal Processors, Architecture, Implementations & Applications, Pearson,2013

DimitrisG.Manolakis, Vinay K. Ingle, applied Digital Signal Processing,Cambridge,2012

GE8076 PROFESSIONAL ETHICS IN ENGINEERING LTPC 3003

OBJECTIVES:

To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES 10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for

others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES 8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXT BOOKS:

Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.

Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.

Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.

John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003

Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.

World Community Service Centre, ' Value Education', Vethathiri publications, Erode, 2011.

Web sources:

www.onlineethics.org
www.nspe.org
www.globalethics.org
www.ethics.org

MG8591 PRINCIPLES OF MANAGEMENT LTPC
3003

OBJECTIVES:

To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization.

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING 9

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V CONTROLLING 9

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXT BOOKS:

1. **JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004.**
2. **Stephen P. Robbins & Mary Coulter, "Management", Prentice Hall (India)Pvt. Ltd., 10th Edition, 2009.**

REFERENCES:

Harold Koontz & Heinz Weihrich, "Essentials of Management", Tata McGraw Hill, 1998.

Robert Kreitner & Mamata Mohapatra, "Management", Biztantra, 2008.

Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management", 7th Edition, Pearson Education, 2011.

Tripathy PC & Reddy PN, "Principles of Management", Tata Mcgraw Hill, 1999

EI8078 PROJECT MANAGEMENT AND FINANCE LTPC 3003

COURSE OBJECTIVES

- **To understand what are the objectives of project management.**
- **To outline the principles followed in carrying out a project.**
- **To demonstrate knowledge and understanding of engineering and management principles.**
- **To function effectively as an individual, and as a member or leader in diverse teams.**
- **To understand the concepts of finance and accounts carried out in project management.**

UNIT I PROJECT MANAGEMENT,PROJECT SELECTION AND PROJECT 9

Objectives of project management: Types of Projects: Project Management Life Cycle: Project Selection: Feasibility study: Estimation of Project Cost, Cost of Capital, Network analysis Techniques: PERT,CPM, Government regulations and statutory for various projects:

UNIT II PROJECT IMPLIMENTATION,MONITORING AND CONTROL 9

Project representation: Role of project managers ,relevance with objective of organization, preliminary manipulations ,Basic Scheduling concepts :Resource levelling ,Resource allocation ,Setting a base line, Project management information system: Importance of contracts in projects: Team work in Project Management: Formation of Effective terms.

UNIT III PROJECT EVALUATION, AUDITING AND OTHER RELATED TOPICS IN 9 PROJECT MANAGEMENT

Project Evaluation: Project auditing: Phase of project audit Project closure reports, computers, e-markets in Project Management:

UNIT IV WORKING CAPITAL MANAGEMENT AND CAPITAL BUDGETING 9

Current assets management: Estimation of working capital requirements: Capital budgeting: Capital budgeting methods: Present value method: Accounting rate of return methods.

UNIT V FINANCE AND ACCOUNTING 9

Source of finance: Term Loans: Capital Structure: Financial Institution Accounting Principles:

Preparation and Interpretation of balance sheets, profit and loss statements , Fixed Assets, Current assets, Depreciation methods :Break even analysis:

TOTAL : 45 PERIODS

COURSE OUTCOMES

- **Ability to study the current market trends and choose projects.**
- **Ability to prepare project feasibility reports.**
- **Ability to implement the project effectively meeting government norms and conditions.**
- **Ability to understand the role and responsibility of the Professional Engineer.**
- **Be able to assess social, health, safety issues based on the reasoning received from the contextual knowledge.**
- **Ability to choose projects which benefit the society and organization.**

TEXT BOOKS:

- **Project Management Institute "A Guide to the Project Management Body of Knowledge" PMBOK® Guide (Sixth Edition), Sept 2017**
- **James C.Van Horne, "Fundamentals of Financial Management", Person Education 2004.**

REFERENCES:

- **Küster J., Huber, E., Lippmann, R., Schmid, A., Schneider, E., Witschi, U., Wüst, R." Project Management Handbook",2015**
- **Khanna, R.B.,"Project Management", PHI 2011.**
- **Prasanna Chandra, "Financial Management", Tata McGraw-Hill,2008.**
- **By Carl S. Warren, James M. Reeve, Jonathan Duchac."Financial & Managerial Accounting",2016**
- **PaneerSelvam, R., and Senthilkumar, P., "Project Management", PHI, 2011.**

IC8071 ADVANCED PROCESS CONTROL LT P C 2203

COURSE OBJECTIVES

- **To teach students to build and analyze models for time-varying systems and non-linear systems.**
- **To develop the skills needed controller, Model-reference applications to design adaptive controllers such as gain-scheduled adaptive adaptive controller and Self-tuning controller for various**
- **To make the students learn to formulate optimal control schemes**
- **To provide basic knowledge about Fractional-order systems and Fractional-order-controller and to lay the foundation for the systematic approach to Design controller for fractional order systems**
- **To introduce FDI Techniques, such as Principal component Analysis, state observer to detect and diagnose faults in sensors and actuators.**

UNIT I CONTROL OF TIME-VARYING AND NONLINEAR SYSTEMS 6+6

Models for Time-varying and Nonlinear systems – Input signal design for Identification – Realtime parameter estimation – Model Validation - Types of Adaptive Control - Gain scheduling - Adaptive Control - Deterministic Self-tuning Controller and Model Reference Adaptive Controller – Control of Hammerstein and Wiener Systems.

UNIT II OPTIMAL CONTROL & FILTERING 6+6

Introduction – Performance Measure for optimal control problem – Dynamic Programming – Computational Procedure for solving Control Problem – LQR – Introduction to Optimal Filtering – Discrete Kalman Filter – Linear Quadratic Gaussian (LQG)

UNIT III FRACTIONAL ORDER SYSTEM & CONTROLLER 6+6

Fractional-order Calculus and Its Computations – Frequency and Time Domain Analysis of Fractional-Order Linear Systems - Filter Approximations to Fractional-Order Differentiations – Model reduction Techniques for Fractional Order Systems –Controller Design Studies for Fractional Order.

UNIT IV H-INFINITY CONTROLLER 6+6

Introduction – Norms for Signals – Robust Stability – Robust Performance – Small Gain Theorem – Optimal H2 Controller Design - H-Infinity Controller Design –– Effects of Weighting Functions in H-Infinity Control.

UNIT V FAULT DIAGNOSIS AND FAULT-TOLERANT CONTROL 6+6

Process Monitoring - Introduction – Statistical Process Control – Fault Detection with Principal Component Analysis – Fault Detection with State Observers – Fault Detection with signal models - Fault Detection of Control Loops- Sensor and Actuator Fault-Tolerant Control Design.

TOTAL: 60 PERIODS

COURSE OUTCOMES

Ability to Apply knowledge of mathematics, science, and engineering to build and analyze models for time-varying systems and non-linear systems.

Ability to design and implement adaptive controllers such as gain-scheduled adaptive controller, Model-reference adaptive controller and Self-tuning controller

Ability to Identify, formulate, and solve optimal controller

Ability to Analyze Fractional-order systems, Fractional-order- controller and Design controller for fractional order systems

Ability to design and implement H2 and H-infinity Controllers

Ability to use the FDI Techniques, such as Principal component Analysis, state observer to detect and diagnose faults in sensors and actuators.

REFERENCE BOOKS

K.J. Astrom and B.J.Wittenmark, "Adaptive Control", Pearson Education, Second Edition, 2008.

Donald E.Kirk, "Optimal Control Theory – An Introduction", Dover Publications, Inc. Mineola, New York, 2012

D.Xue, Y.Q.Chen, D.P.Atherton, "Linear Feedback Control Analysis and Design with MATLAB, Advances In Design and Control", Society for Industrial and Applied Mathematics, 2008.

R. Isermann, "Fault-Diagnosis Systems: An Introduction from Fault Detection to Fault Tolerance", Springer, 2006.

EI8079 ROBOTICS AND AUTOMATION LTPC

3003

AIM

To provide comprehensive knowledge of robotics in the design, analysis and control point of view.

COURSE OBJECTIVES

To study the various parts of robots and fields of robotics.

To study the various kinematics and inverse kinematics of robots.

To study the Euler, Lagrangian formulation of Robot dynamics.

To study the trajectory planning for robot.

To study the control of robots for some specific applications.

To educate on various path planning techniques

To introduce the dynamics and control of manipulators

UNIT I BASIC CONCEPTS 9

Definition and origin of robotics – different types of robotics – various generations of robots – degrees of freedom – Robot classifications and specifications- Asimov's laws of robotics – dynamic stabilization of robots.

UNIT II POWER SOURCES, SENSORS AND ACTUATORS 9

Hydraulic, pneumatic and electric drives: Design and controlissues – determination of HP of motor and gearing ratio – variable speed arrangements – path determination – micro machines in robotics – machine vision – ranging – laser – acoustic – magnetic, fiber optic and tactile sensors.

UNIT III MANIPULATORS AND GRIPPERS DIFFERENTIAL MOTION 9

Construction of manipulators – manipulator dynamics and force control – electronic and pneumatic manipulator control circuits – end effectors – U various types of grippers – design considerations.

UNIT IV KINEMATICS AND PATH PLANNING 9

Linear and angular velocities-Manipulator Jacobian-Prismatic and rotary joints–Inverse -Wrist andarm singularity - Static analysis - Force and moment BalanceSolution kinematics problem – robot programming languages.

UNIT V DYNAMICS AND CONTROL AND APPLICATIONS 9

Lagrangian mechanics-2DOF Manipulator-Lagrange Euler formulation-Dynamic model – Manipulatorcontrol problem-Linear control schemes-PID control scheme- Force control of robotic manipulator.Mutiple robots – machine interface – robots in manufacturing and non-manufacturing applications – robot cell design – selection of robot.

TOTAL : 45 PERIODS

COURSE OUTCOMES

At the end of the course, the student should be able to:

Understand the evolution of robot technology and mathematically represent different types of robot.

Get exposed to the case studies and design of robot machine interface. Familiarize various control schemes of Robotics control

TEXT BOOKS

Mikell P. Weiss G.M., Nagel R.N., Odraj N.G., Industrial Robotics, McGraw-Hill Singapore, 2015.

Saeed B Niku, Introduction to Robotics, Analysis, Systems, Applications Prentice Hall, 3 edition 2104.

REFERENCES

Deb.S.R., Robotics technology and flexible Automation, John Wiley, USA 1992.

Asfahl C.R., Robots and manufacturing Automation, John Wiley, USA 1992.

Klafter R.D., Chimielewski T.A., Negin M., Robotic Engineering – An integrated approach, Prentice Hall of India, New Delhi, 1994.

R.K.Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi,4th Reprint, 2005

JohnJ.Craig ,Introduction to Robotics Mechanics and Control, Third edition, Pearson Education,2009.

Issac Asimov I Robot, Ballantine Books, New York, 1986.

GE8073 FUNDAMENTALS OF NANOSCIENCE LTPC

3 003

OBJECTIVES:

To learn about basis of nanomaterial science, preparation method, types and application

UNIT I INTRODUCTION 8

Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-

multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II GENERAL METHODS OF PREPARATION 9

Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III NANOMATERIALS 12

Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications- Nanometal oxides-ZnO, TiO2,MgO, ZrO2, NiO, nanoalumina, CaO, AgTiO2, Ferrites, Nanoclays-functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

UNIT IV CHARACTERIZATION TECHNIQUES 9

X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation.

UNIT V APPLICATIONS 7

NanoInfoTech: Information storage- nanocomputer, molecular switch, super chip, nanocrystal, Nanobiotechlogy: nanoprobes in medical diagnostics and biotechnology, Nano medicines, Targetted drug delivery, Bioimaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nanosensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sunbarrier products - In Photostat, printing, solar cell, battery.

TOTAL : 45 PERIODS

OUTCOMES:

Will familiarize about the science of nanomaterials

Will demonstrate the preparation of nanomaterials

Will develop knowledge in characteristic nanomaterial

TEXT BOOKS :

1. A.S. Edelstein and R.C. Cammearata, eds., "Nanomaterials: Synthesis, Properties and Applications", Institute of Physics Publishing, Bristol and Philadelphia, 1996.

2. N John Dinardo, "Nanoscale Charecterisation of surfaces & Interfaces", 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000.

REFERENCES:

G Timp, "Nanotechnology", AIP press/Springer, 1999.

Akhlesh Lakhtakia,"The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations". Prentice-Hall of India (P) Ltd, New Delhi, 2007.

ANNA UNIVERSITY, CHENNAI
NON - AUTONOMOUS COLLEGES AFFILIATED ANNA UNIVERSITY
REGULATIONS 2021
B. E. COMPUTER SCIENCE AND ENGINEERING
CHOICE BASED CREDIT SYSTEM
I AND II SEMESTERS
CURRICULA AND SYLLABI

I. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates can

- Apply their technical competence in computer science to solve real world problems, with technical and people leadership.
- Conduct cutting edge research and develop solutions on problems of social relevance.
- Work in a business environment, exhibiting team skills, work ethics, adaptability and lifelong learning.

II. PROGRAM SPECIFIC OUTCOMES (PSOs)

The Students will be able to

- Exhibit design and programming skills to build and automate business solutions using cutting edge technologies.
- Strong theoretical foundation leading to excellence and excitement towards research, to provide elegant solutions to complex problems.

SEMESTER I

S. NO.	COURSE	COURSE TITLE	CATE-	PERIODS PER			TOTAL CONTACT	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
THEORY								
2.	HS3151	Professional English - I	HSMC	3	1	0	4	4
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3	0	0	3	3
5.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
6.	GE3151	Problem Solving and Python Programming	ESC	3	0	0	3	3
PRACTICALS								
7.	GE3171	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
8.	BS3171	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
			TOTAL	**15**	**2**	**8**	**25**	**21**

SEMESTER II

S. NO.	COURSE	COURSE TITLE	CATE-	PERIODS PER			TOTAL CONTACT	CREDITS
				L	T	P		
THEORY								
1.	HS3251	Professional English - II	HSMC	3	1	0	4	4
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	PH3256	Physics for Information Science	BSC	3	0	0	3	3
4.	BE3251	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	3
5.	GE3251	Engineering Graphics	ESC	2	0	4	6	4
6.	CS3251	Programming in C	PCC	3	0	0	3	3
7.		NCC Credit Course Level 1*	-	2	0	0	2	2*
PRACTICALS								
8.	GE3271	Engineering Practices Laboratory	ESC	0	0	4	4	2
9.	CS3271	Programming in C Laboratory	PCC	0	0	4	4	2
			TOTAL	**17**	**2**	**12**	**31**	**25**

*NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

IP3151 **INDUCTION PROGRAMME**

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it everyday for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and
also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.
Discussions would be conducted in small groups of about 20 students with a faculty
mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References:
Guide to Induction program from AICTE

HS3151 PROFESSIONAL ENGLISH - I L T P C

3 1 0 4

OBJECTIVES :

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
- To use language efficiently in expressing their opinions via various media.

INTRODUCTION TO EFFECTIVE COMMUNICATION **1**

What is effective communication? (There are many interesting activities for this.)

Why is communication critical for excellence during study, research and work?

What are the seven C's of effective communication?

What are key language skills?

What is effective listening? What does it involve?

What is effective speaking?
What does it mean to be an excellent reader? What should you be able to do?
What is effective writing?
How does one develop language and communication skills?
What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

UNIT I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION **11**

Listening –for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form
Speaking - Self Introduction; Introducing a friend; Conversation - politeness strategies; Telephone conversation; Leave a voicemail; Leave a message with another person; asking for information to fill details in a form.
Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails.
Writing - Writing emails / letters introducing oneself
Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags
Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II NARRATION AND SUMMATION **12**

Listening - Listening to podcast, anecdotes / stories / event narration; documentaries and interviews with celebrities.
Speaking - Narrating personal experiences / events; Interviewing a celebrity; Reporting / and summarising of documentaries / podcasts/ interviews.
Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs.
Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.)
Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions
Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

UNIT III DESCRIPTION OF A PROCESS / PRODUCT **12**

Listening - Listen to a product and process descriptions; a classroom lecture;and advertisements about a products.
Speaking – Picture description; Giving instruction to use the product; Presenting a product; and Summarising a lecture.
Reading – Reading advertisements, gadget reviews; user manuals.
Writing - Writing definitions; instructions; and Product /Process description.
Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses.
Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words)

UNIT IV CLASSIFICATION AND RECOMMENDATIONS **12**

Listening – Listening to TED Talks; Scientific lectures; and educational videos.

Speaking – Small Talk; Mini presentations and making recommendations.
Reading – Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc,.)
Writing – Note-making / Note-taking (*Study skills to be taught, not tested); ; Writing
recommendations; Transferring information from non verbal (chart , graph etc, to verbal mode)
Grammar – Articles; Pronouns - Possessive & Relative pronouns.
Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT V EXPRESSION 12

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions.
Speaking –group discussions, Debates, and Expressing opinions through Simulations & Roleplay.
Reading – Reading editorials; and Opinion Blogs;
Writing – Essay Writing (Descriptive or narrative).
Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences.
Vocabulary - Cause & Effect Expressions – Content vs Function words.

TOTAL : 60 PERIODS

OUTCOMES :

At the end of the course, learners will be able

 To listen and comprehend complex academic texts To read and infer the denotative and connotative meanings of technical texts
 To write definitions, descriptions, narrations and essays on various topics
 To speak fluently and accurately in formal and informal communicative contexts
 To express their opinions effectively in both oral and written medium of communication

TEXT BOOKS :

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021.
   Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3. English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill
   Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi,2003.

MA3151 MATRICES AND CALCULUS L T P C
3 1 0 4

OBJECTIVES :

 To develop the use of matrix algebra techniques that is needed by engineers for practical applications.

- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNITI MATRICES 9+3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications : Stretching of an elastic membrane.

UNITII DIFFERENTIAL CALCULUS 9+3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications : Maxima and Minima of functions of one variable.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9+3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNITIV INTEGRAL CALCULUS 9+3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration : Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications : Hydrostatic force and pressure, moments and centres of mass.

UNITV MULTIPLE INTEGRALS 9+3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications : Moments and centres of mass, moment of inertia.

TOTAL : 60 PERIODS

OUTCOMES :

At the end of the course the students will be able to

- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Able to use differential calculus ideas on several variable functions.
- Apply different methods of integration in solving practical problems.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS :

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3. James Stewart, "Calculus : Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :

1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
2. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan. S. and Manicavachagom Pillai. T. K.,"Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, " Engineering Mathematics " Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, " Thomas Calculus ", 14th Edition, Pearson India, 2018.

PH3151 ENGINEERING PHYSICS L T P C
3 0 0 3

OBJECTIVES:

- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to be successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNITI MECHANICS 9

Multiparticle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

UNIT II ELECTROMAGNETIC WAVES 9

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium- vacuum interface for normal incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS 9

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference –Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO_2 laser, semiconductor laser –Basic applications of lasers in industry.

UNIT IV BASIC QUANTUM MECHANICS 9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes-

Normalization, probabilities and the correspondence principle.

UNIT V APPLIED QUANTUM MECHANICS 9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

TOTAL : 45 PERIODS

OUTCOMES:

After completion of this course, the students should be able to

- Understand the importance of mechanics.
- Express their knowledge in electromagnetic waves.
- Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
- Understand the importance of quantum physics.
- Comprehend and apply quantum mechanical principles towards the formation of energy bands.

TEXT BOOKS:

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw-Hill (Indian Edition), 2017.

REFERENCES:

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer-Verlag, 2012.

CY3151 ENGINEERING CHEMISTRY L T P C
3 0 0 3

OBJECTIVES:

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

UNIT I WATER AND ITS TREATMENT 9

Water: Sources and impurities, **Water quality parameters:** Definition and significance of-colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. **Municipal water treatment:** primary treatment and disinfection (UV, Ozonation, break-point chlorination)**.**

Desalination of brackish water: Reverse Osmosis. **Boiler troubles:** Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. **Treatment of boiler feed water**: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralisation and zeolite process.

UNIT II NANOCHEMISTRY 9

Basics: Distinction between molecules, nanomaterials and bulk materials; **Size-dependent properties** (optical, electrical, mechanical and magnetic); **Types of nanomaterials**: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. **Preparation of nanomaterials:** sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. **Applications** of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT III PHASE RULE AND COMPOSITES 9

Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process.

Composites: Introduction: Definition & Need for composites; **Constitution**: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). **Properties and applications of**: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. **Hybrid composites** - definition and examples.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction: Classification of fuels; **Coal and coke**: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). **Petroleum and Diesel:** Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; **Power alcohol and biodiesel.**

Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; **Ignition temperature**: spontaneous ignition temperature, Explosive range; **Flue gas analysis** - ORSAT Method. **CO_2 emission and carbon foot print.**

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Stability of nucleus: mass defect (problems), binding energy;Nuclear energy: light water nuclear power plant, breeder reactor. **Solar energy conversion:** Principle, working and applications of solar cells**; Recent developments in solar cell materials. Wind energy; Geothermal energy;Batteries:** Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion-battery; **Electric vehicles-working principles; Fuel cells:** H_2-O_2 fuel cell, microbial fuel cell; **Supercapacitors:** Storage principle, types and examples.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students will be able:

- To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
- To apply the knowledge of phase rule and composites for material selection requirements.
- To recommend suitable fuels for engineering processes and applications.

- To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

GE3151 PROBLEM SOLVING AND PYTHON PROGRAMMING L T P C

3 0 0 3

OBJECTIVES:

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING 9

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions:

return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems. CO2: Develop and execute simple Python programs.CO3: Write simple Python programs using conditionals and looping for solving problems. CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries etc.
CO6: Read and write data from/to files in Python programs.

TEXT BOOKS:

1. Allen B. Downey, "Think Python : How to Think like a Computer Scientist", 2nd Edition,
   O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data'', Third Edition, MIT Press
   2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill,2018.

HS3251 PROFESSIONAL ENGLISH - II L T P C

3 1 0 4

OBJECTIVES :

- To engage learners in meaningful language activities to improve their LSRW skills
- To enhance learners' awareness of general rules of writing for specific audiences
- To help learners understand the purpose, audience, contexts of different types of writing
- To develop analytical thinking skills for problem solving in communicative contexts
- To demonstrate an understanding of job applications and interviews for internship and

placements

UNIT I MAKING COMPARISONS 12

Listening – Evaluative Listening: Advertisements, Product Descriptions, -Audio / video; Listening and filling a Graphic Organiser (Choosing a product or service by comparison)
Speaking – Marketing a product, Persuasive Speech Techniques.
Reading - Reading advertisements, user manuals, brochures;
Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases
Vocabulary – Contextual meaning of words

UNIT II EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING 12

Listening - Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects - Speaking – Describing and discussing the reasons of accidents or disasters based on news reports.
Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint,
Writing - Writing responses to complaints.
Grammar - Active Passive Voice transformations, Infinitive and Gerunds Vocabulary – Word Formation (Noun-Verb-Adj-Adv),
Adverbs.

UNIT III PROBLEM SOLVING 12

Listening – Listening to / Watching movie scenes/ documentaries depicting a technical problem and suggesting solutions.
Speaking – Group Discussion(based on case studies), - techniques and Strategies,
Reading - Case Studies, excerpts from literary texts, news reports etc.,
Writing – Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay
Grammar -– Error correction; If conditional sentences
Vocabulary - Compound Words, Sentence Completion.

UNIT IV REPORTING OF EVENTS AND RESEARCH 12

Listening – Listening Comprehension based on news reports – and documentaries – Precis writing, Summarising, Speaking –Interviewing, Presenting an oral report, Mini presentations on select topics; Reading –Newspaper articles; Writing – Recommendations, Transcoding, Accident Report, Survey Report Grammar – Reported Speech, Modals Vocabulary – Conjunctions- use of prepositions

UNIT V THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY 12

Listening – Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance); Speaking – Participating in a Role play, (interview/telephone interview), virtual interviews, Making presentations with visual aids; Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses
Vocabulary – Idioms.

TOTAL : 60 PERIODS

OUTCOMES:

At the end of the course, learners will be able

- To compare and contrast products and ideas in technical texts.
- To identify cause and effects in events, industrial processes through technical texts
- To analyse problems in order to arrive at feasible solutions and communicate them orally

and in the written format.

- To report events and the processes of technical and industrial nature.
- To present their opinions in a planned and logical manner, and draft effective resumes in context of job search.

TEXT BOOKS :

1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University.
2. English for Science & Technology Cambridge University Press 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, NewDelhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd.
   1990, Delhi.

MA3251 STATISTICS AND NUMERICAL METHODS L T P C

3 1 0 4

COURSE OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 9 + 3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS 9 + 3

One way and two way classifications - Completely randomized design – Randomized block design

– Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9 + 3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9 +3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9 +3

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.
- Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

PH3256	PHYSICS FOR INFORMATION SCIENCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To make the students understand the importance in studying electrical properties of materials.
- To enable the students to gain knowledge in semiconductor physics
- To instill knowledge on magnetic properties of materials.
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications
- To inculcate an idea of significance of nano structures, quantum confinement, ensuing nano device applications and quantum computing.

UNIT I ELECTRICAL PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - electrons in metals – Particle in a three dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole.

UNIT II SEMICONDUCTOR PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration – Carrier transport in Semiconductor: random motion, drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.

UNIT III MAGNETIC PROPERTIES OF MATERIALS 9

Magnetic dipole moment – atomic magnetic moments- magnetic permeability and susceptibility - Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism – antiferromagnetism – ferrimagnetism – Ferromagnetism: origin and exchange interaction-saturation magnetization and Curie temperature – Domain Theory- M versus H behaviour – Hard and soft magnetic materials – examples and uses-– Magnetic principle in computer data storage – Magnetic hard disc (GMR sensor).

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) - photo current in a P-N diode – solar cell - LED – Organic LED – Laser diodes – Optical data storage techniques.

UNIT V NANODEVICES AND QUANTUM COMPUTING 9

Introduction - quantum confinement – quantum structures: quantum wells, wires and dots — band gap of nanomaterials. Tunneling – Single electron phenomena: Coulomb blockade - resonant-tunneling diode – single electron transistor – quantum cellular automata - Quantum system for information processing - quantum states – classical bits – quantum bits or qubits –CNOT gate - multiple qubits – Bloch sphere – quantum gates – advantage of quantum computing over classical computing.

TOTAL :45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to

- gain knowledge on classical and quantum electron theories, and energy band structures
- acquire knowledge on basics of semiconductor physics and its applications in various devices
- get knowledge on magnetic properties of materials and their applications in data storage,
- have the necessary understanding on the functioning of optical materials for optoelectronics
- understand the basics of quantum structures and their applications and basics of quantum computing

TEXT BOOKS:

1. Jasprit Singh, "Semiconductor Devices: Basic Principles", Wiley (Indian Edition), 2007.
2. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw-Hill Education (Indian Edition), 2020.
3. Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-Hill Education (Indian Edition), 2020.

REFERENCES:

1. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
2. Y.B.Band and Y.Avishai, Quantum Mechanics with Applications to Nanotechnology and Information Science, Academic Press, 2013.
3. V.V.Mitin, V.A. Kochelap and M.A.Stroscio, Introduction to Nanoelectronics, Cambridge Univ.Press, 2008.
4. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson Education (Indian Edition) 2009.
5. B.Rogers, J.Adams and S.Pennathur, Nanotechnology: Understanding Small Systems, CRC Press, 2014.

BE3251 BASIC ELECTRICAL AND ELECTRONICS **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To introduce the basics of electric circuits and analysis
- To impart knowledge in the basics of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To educate on the fundamental concepts of digital electronics
- To introduce the functional elements and working of measuring instruments

UNIT I ELECTRICAL CIRCUITS **9**

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state)

Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state

analysis of RLC circuits (Simple problems only)

UNIT II ELECTRICAL MACHINES 9

Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.

UNIT III ANALOG ELECTRONICS 9

Resistor, Inductor and Capacitor in Electronic Circuits- Semiconductor Materials: Silicon &Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications – Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET,IGBT – Types, I-V Characteristics and Applications, Rectifier and Inverters

UNIT IV DIGITAL ELECTRONICS 9

Review of number systems, binary codes, error detection and correction codes, Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps (Simple Problems only)**.**

UNIT V MEASUREMENTS AND INSTRUMENTATION 9

Functional elements of an instrument, Standards and calibration, Operating Principle, types - Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT, DSO- Block diagram- Data acquisition**.**

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After completing this course, the students will be able to

- **CO1:** Compute the electric circuit parameters for simple problems
- **CO2:** Explain the working principle and applications of electrical machines
- **CO3:** Analyze the characteristics of analog electronic devices
- **CO4:** Explain the basic concepts of digital electronics
- **CO5:** Explain the operating principles of measuring instruments

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020
2. S.K.Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.
3. Sedha R.S., "A textbook book of Applied Electronics", S. Chand & Co., 2008
4. James A .Svoboda, Richard C. Dorf, "Dorf's Introduction to Electric Circuits", Wiley, 2018.
5. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.

REFERENCES
:

1. Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill
2. Education, 2019.
3. Thomas L. Floyd, 'Digital Fundamentals', 11th Edition, Pearson Education, 2017.
4. Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017.
5. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
6. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

GE3251 ENGINEERING GRAPHICS L T P C
2 0 4 4

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

- Drawing engineering curves.
- Drawing a freehand sketch of simple objects.
- Drawing orthographic projection of solids and section of solids.
- Drawing development of solids
- Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications — Use of drafting instruments — BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning**.**

UNIT I PLANE CURVES AND FREEHAND SKETCHING 6+12

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS

6+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.

Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6 +12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.

Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12

Principles of isometric projection — isometric scale — isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids - Prisms, pyramids and cylinders by visual ray method.

Practicing three dimensional modeling of isometric projection of simple objects by CAD Software

(Not for examination)

TOTAL: (L=30+P=60) 90 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

- Use BIS conventions and specifications for engineering drawing.
- Construct the conic curves, involutes and cycloid.
- Solve practical problems involving projection of lines.
- Draw the orthographic, isometric and perspective projections of simple solids.
- Draw the development of simple solids.

TEXT BOOK:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House,

   53rd Edition, 2019.

2. Natarajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers,

   Chennai, 2018.

3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press,

   2015

REFERENCES:

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019.

2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications,

   Bangalore, 27th Edition, 2017.

3. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

4. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New

   Delhi, 2015.

5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition,

   2009.

6. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited,

   2008.

Publication of Bureau of Indian Standards:

1. IS 10711 — 2001: Technical products Documentation — Size and layout of drawing sheets.
2. IS 9609 (Parts 0 & 1) — 2001: Technical products Documentation — Lettering.
3. IS 10714 (Part 20) — 2001 & SP 46 — 2003: Lines for technical drawings.
4. IS 11669 — 1986 & SP 46 —2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) — 2001: Technical drawings — Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.

3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitt to use appropriate scale to fit a solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

CS3251 PROGRAMMING IN C L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the constructs of C Language.
- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop modular applications in C using functions
- To develop applications in C using pointers and structures
- To do input/output and file handling in C

UNIT I BASICS OF C PROGRAMMING 9

Introduction to programming paradigms – Applications of C Language - Structure of C program - C programming: Data Types - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Preprocessor directives - Compilation process

UNIT II ARRAYS AND STRINGS 9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays - String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.

UNIT III FUNCTIONS AND POINTERS 9

Modular programming - Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions – Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Parameter passing: Pass by value, Pass by reference.

UNIT IV STRUCTURES AND UNION 9

Structure - Nested structures – Pointer and Structures – Array of structures – Self referential structures – Dynamic memory allocation - Singly linked list – typedef – Union - Storage classes and Visibility.

UNIT V FILE PROCESSING 9

Files – Types of file processing: Sequential access, Random access – Sequential access file - Random access file - Command line arguments.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to CO1: Demonstrate knowledge on C Programming constructs CO2: Develop simple applications in C using basic constructs CO3: Design and implement applications using arrays and strings CO4: Develop and implement modular applications in C using functions. CO5: Develop applications in C using structures and pointers.

CO6: Design applications using sequential and random access file processing.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.
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1. Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education, 2018.
2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
3. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.
4. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second
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6. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.

ANNA UNIVERSITY, CHENNAI
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B.E. COMPUTER SCIENCE AND ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

To enable graduates to pursue higher education and research, or have a successful career in industries associated with Computer Science and Engineering, or as entrepreneurs. To ensure that graduates will have the ability and attitude to adapt to emerging technological changes.

PROGRAM OUTCOMES POs:

Engineering Graduates will be able to:

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

To analyze, design and develop computing solutions by applying foundational concepts of Computer Science and Engineering.

To apply software engineering principles and practices for developing quality software for scientific and business applications.

To adapt to emerging Information and Communication Technologies (ICT) to innovate ideas and solutions to existing/novel problems.

Mapping of POs/PSOs to PEOs

Contribution 1: Reasonable 2:Significant 3:Strong

	PEOs	
POs	1. Graduates will pursue higher education and research, or have a successful career in industries associated with Computer Science and Engineering, or as entrepreneurs.	2. Graduates will have the ability and attitude to adapt to emerging technological changes.
1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	1
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	3	1
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	3	2
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	3	2
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	2	3
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	2	2

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	2	1
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	3	1
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	3	2
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	3	2
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	2	2
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	1	3

PSOs		
1. Analyze, design and develop computing solutions by applying foundational concepts of computer science and engineering.	3	1
2. Apply software engineering principles and practices for developing quality software for scientific and business applications.	3	1
3. Adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.	1	3

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

A broad relation between the Course Outcomes and Programme Outcomes is given in the following table

	Course Title	Programme Outcome (PO)											
		1	2	3	4	5	6	7	8	9	10	11	12
SEMESTER I	Communicative English								√	√	√		√
	Engineering Mathematics - I	√	√	√						√			
	Engineering Physics	√	√	√									
	Engineering Chemistry	√	√	√									
	Problem Solving and Python Programming	√	√	√									
	Engineering Graphics	√	√	√		√			√	√	√		√
	Problem Solving and Python Programming Laboratory	√	√	√		√			√	√	√		√
	Physics and Chemistry Laboratory	√	√	√					√	√	√		
SEMESTER II	Technical English								√	√	√		√
	Engineering Mathematics II	√	√	√						√			
	Physics for Information Science	√	√	√									
	Basic Electrical, Electronics and Measurement Engineering	√	√	√									
	Environmental Science and Engineering	√	√	√				√	√	√	√		√
	Programming in C	√	√	√					√	√	√		√
	Engineering Practices Laboratory	√	√	√	√	√	√		√	√	√		√
	C Programming Laboratory	√	√	√					√	√	√		√

		PROGRAMME OUTCOME (PO)												
		COURSE TITLE	1	2	3	4	5	6	7	8	9	**10**	**11**	**12**
YEAR I	III SEMESTER	Discrete Mathematics	√	√	√						√			
		Digital Principles and Design	√	√	√									
		Data Structures	√	√	√									
		Object Oriented Programming	√ √	√ √	√ √					√	√	√		√
		Communication Engineering	√	√	√									
		Data Structures Laboratory												
		Object Oriented Programming Laboratory	√	√	√					√	√	√		√
		Digital Systems Laboratory	√	√	√			√		√	√	√		√
		Interpersonal Skills/Listening &Speaking								√	√	√		√
	IV SEMESTER	Probability and Queueing Theory	√	√	√						√	√		√
		Computer Architecture	√	√	√									
		Database Management Systems	√	√	√									
		Design and Analysis of Algorithms	√	√	√						√	√		√
		Operating Systems	√	√	√									
		Engineering	√	√	√		√	√		√	√	√		√
		Database Management Systems Laboratory	√	√	√					√	√	√		√
		Operating Systems Laboratory	√	√	√					√	√	√		√
		Advanced Reading and Writing								√	√	√		√

YEAR III	SEMESTER V	Algebra and Number Theory	√	√	√						√			
		Computer Networks	√	√	√									
		Microprocessors and Microcontrollers	√	√	√									
		Theory of Computation	√	√	√									
		Object Oriented Analysis and Design	√	√	√			√						
		Open Elective I												
		Microprocessors and Microcontrollers Laboratory	√	√	√					√	√	√		√
		Object Oriented Analysis and Design Laboratory	√	√	√		√	√		√	√	√		√
		Networks Laboratory	√	√	√					√	√	√		√
	SEMESTER VI	Internet Programming	√	√	√					√	√	√		√
		Artificial Intelligence	√	√	√									
		Mobile Computing	√	√	√									
		Compiler Design	√	√	√					√	√	√		√
		Distributed Systems	√	√	√									
		Professional Elective I												
		Internet Programming Laboratory	√	√	√		√			√	√	√		√
		Mobile Application Development Laboratory	√	√	√		√	√		√	√	√		√
		Mini Project	√	√	√	√	√	√	√	√	√	√	√	√
		Professional Communication												
YEAR IV	SEMESTER VII	Principles of Management	√	√	√								√	
		Cryptography and Network Security	√	√	√									
		Cloud Computing	√	√	√									
		Open Elective II												

		Professional Elective II												
		Professional Elective III												
		Cloud Computing Laboratory	√	√	√		√			√	√	√		√
		Security Laboratory	√	√	√		√			√	√	√		√
	SEMESTER VIII	Professional Elective IV												
		Professional Elective V												
		Project Work	√	√	√	√	√	√	√	√	√	√	√	√

PROFESSIONAL ELECTIVES

SEM	COURSE TITLE	PROGRAMME OUTCOME (PO)											
		1	2	3	4	5	6	7	8	9	10	11	12
VI	Data Warehousing and Data Mining	√	√	√									
	Software Testing	√	√	√		√				√	√		
	Embedded Systems	√	√	√									
	Agile Methodologies	√	√	√									
	Graph Theory and Applications-	√	√	√									
	Intellectual Property Rights						√	√	√	√	√	√	√
	Digital Signal Processing	√	√	√									
VII	Big Data Analytics	√	√	√		√				√	√		
	Machine Learning Techniques	√	√	√		√				√	√		
	Computer Graphics and Multimedia	√	√	√									
	Software Project Management	√	√	√			√		√	√	√	√	√
	Internet of Things	√	√	√									
	Service Oriented Architecture	√	√	√									
	Total Quality Management	√	√	√								√	
	Multi-core Architectures and Programming	√	√	√									
	Human Computer Interaction	√	√	√									
	C# and .Net Programming	√	√	√		√				√	√		
	Wireless Adhoc and Sensor Networks	√	√	√									
	Advanced Topics on Databases	√	√	√									
	Foundation Skills in Integrated Product Development	√	√	√									
	Human Rights	√	√	√									
	Disaster Management	√	√	√				√					
VIII	Digital Image Processing	√	√	√									
	Social Network Analysis	√	√	√									
	Information Security	√	√	√					√				
	Software Defined Networks	√	√	√									
	Cyber Forensics	√	√	√					√				
	Soft Computing	√	√	√									
	Professional Ethics in Engineering						√	√	√	√	√		√
	Information Retrieval Techniques	√	√	√									
	Green Computing	√	√	√									
	GPU Architecture and Programming	√	√	√									
	Natural Language Processing	√	√	√									
	Parallel Algorithms	√	√	√									
	Speech Processing	√	√	√									
	Fundamentals of Nanoscience	√	√	√									

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I - VIII SEMESTERS CURRICULA AND SYLLABI

SEMESTER I

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	MA8151	Engineering Mathematics - I	BS	4	4	0	0	4
3.	PH8151	Engineering Physics	BS	3	3	0	0	3
4.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
6.	GE8152	Engineering Graphics	ES	6	2	0	4	4
PRACTICALS								
7.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
8.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
			TOTAL	**31**	**19**	**0**	**12**	**25**

SEMESTER II

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8251	Technical English	HS	4	4	0	0	4
2.	MA8251	Engineering Mathematics - II	BS	4	4	0	0	4
3.	PH8252	Physics for Information Science	BS	3	3	0	0	3
4.	BE8255	Basic Electrical, Electronics and Measurement Engineering	ES	3	3	0	0	3
5.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
6.	CS8251	Programming in C	PC	3	3	0	0	3
PRACTICALS								
7.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
8.	CS8261	C Programming Laboratory	PC	4	0	0	4	2
			TOTAL	**28**	**20**	**0**	**8**	**24**

SEMESTER III

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8351	Discrete Mathematics	BS	4	4	0	0	4
2.	CS8351	Digital Principles and System Design	ES	4	4	0	0	4
3.	CS8391	Data Structures	PC	3	3	0	0	3
4.	CS8392	Object Oriented Programming	PC	3	3	0	0	3
5.	EC8395	Communication Engineering	ES	3	3	0	0	3
PRACTICALS								
6.	CS8381	Data Structures Laboratory	PC	4	0	0	4	2
7.	CS8383	Object Oriented Programming Laboratory	PC	4	0	0	4	2
8.	CS8382	Digital Systems Laboratory	ES	4	0	0	4	2
9.	HS8381	Interpersonal Skills/Listening &Speaking	EEC	2	0	0	2	1
			TOTAL	**31**	**17**	**0**	**14**	**24**

SEMESTER IV

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8402	Probability and Queueing Theory	BS	4	4	0	0	4
2.	CS8491	Computer Architecture	PC	3	3	0	0	3
3.	CS8492	Database Management Systems	PC	3	3	0	0	3
4.	CS8451	Design and Analysis of Algorithms	PC	3	3	0	0	3
5.	CS8493	Operating Systems	PC	3	3	0	0	3
6.	CS8494	Software Engineering	PC	3	3	0	0	3
PRACTICALS								
7.	CS8481	Database Management Systems Laboratory	PC	4	0	0	4	2
8.	CS8461	Operating Systems Laboratory	PC	4	0	0	4	2
9.	HS8461	Advanced Reading and Writing	EEC	2	0	0	2	1
			TOTAL	**29**	**19**	**0**	**10**	**24**

SEMESTER V

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8551	Algebra and Number Theory	BS	4	4	0	0	4
2.	CS8591	Computer Networks	PC	3	3	0	0	3
3.	EC8691	Microprocessors and Microcontrollers	PC	3	3	0	0	3
4.	CS8501	Theory of Computation	PC	3	3	0	0	3
5.	CS8592	Object Oriented Analysis and Design	PC	3	3	0	0	3
6.		Open Elective I	OE	3	3	0	0	3
PRACTICALS								
7.	EC8681	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
8.	CS8582	Object Oriented Analysis and Design Laboratory	PC	4	0	0	4	2
9.	CS8581	Networks Laboratory	PC	4	0	0	4	2
			TOTAL	**31**	**19**	**0**	**12**	**25**

SEMESTER VI

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	CS8651	Internet Programming	PC	3	3	0	0	3
2.	CS8691	Artificial Intelligence	PC	3	3	0	0	3
3.	CS8601	Mobile Computing	PC	3	3	0	0	3
4.	CS8602	Compiler Design	PC	5	3	0	2	4
5.	CS8603	Distributed Systems	PC	3	3	0	0	3
6.		Professional Elective I	PE	3	3	0	0	3
PRACTICALS								
7.	CS8661	Internet Programming Laboratory	PC	4	0	0	4	2
8.	CS8662	Mobile Application Development Laboratory	PC	4	0	0	4	2
9.	CS8611	Mini Project	EEC	2	0	0	2	1
10.	HS8581	Professional Communication	EEC	2	0	0	2	1
			TOTAL	**32**	**18**	**0**	**14**	**25**

SEMESTER VII

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MG8591	Principles of Management	HS	3	3	0	0	3
2.	CS8792	Cryptography and Network Security	PC	3	3	0	0	3
3.	CS8791	Cloud Computing	PC	3	3	0	0	3
4.		Open Elective II	OE	3	3	0	0	3
5.		Professional Elective II	PE	3	3	0	0	3
6.		Professional Elective III	PE	3	3	0	0	3
PRACTICALS								
7.	CS8711	Cloud Computing Laboratory	PC	4	0	0	4	2
8.	IT8761	Security Laboratory	PC	4	0	0	4	2
			TOTAL	**26**	**18**	**0**	**8**	**22**

SEMESTER VIII

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Professional Elective IV	PE	3	3	0	0	3
2.		Professional Elective V	PE	3	3	0	0	3
PRACTICALS								
3.	CS8811	Project Work	EEC	20	0	0	20	10
			TOTAL	**26**	**6**	**0**	**20**	**16**

TOTAL NO. OF CREDITS: 185

HUMANITIES AND SOCIAL SCIENCES (HS)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	HS8251	Technical English	HS	4	4	0	0	4
3.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
4.	MG8591	Principles of Management	HS	3	3	0	0	3

BASIC SCIENCES (BS)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA8151	Engineering Mathematics I	BS	4	4	0	0	4
2.	PH8151	Engineering Physics	BS	3	3	0	0	3
3.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
4.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
5.	MA8251	Engineering Mathematics II	BS	4	4	0	0	4
6.	PH8252	Physics for Information Science	BS	3	3	0	0	3
7.	MA8351	Discrete Mathematics	BS	4	4	0	0	4
8.	MA8402	Probability and Queueing Theory	BS	4	4	0	0	4
9.	MA8551	Algebra and Number Theory	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
2.	GE8152	Engineering Graphics	ES	6	2	0	4	4
3.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
4.	BE8255	Basic Electrical, Electronics and Measurement Engineering	ES	3	3	0	0	3
5.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
6.	CS8351	Digital Principles and System Design	ES	4	4	0	0	4
7.	EC8395	Communication Engineering	ES	3	3	0	0	3
8.	CS8382	Digital Systems Laboratory	ES	4	0	0	4	2

PROFESSIONAL CORE (PC)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8251	Programming in C	PC	3	3	0	0	3
2.	CS8261	C Programming Laboratory	PC	4	0	0	4	2
3.	CS8391	Data Structures	PC	3	3	0	0	3
4.	CS8392	Object Oriented Programming	PC	3	3	0	0	3
5.	CS8381	Data Structures Laboratory	PC	4	0	0	4	2
6.	CS8383	Object Oriented Programming Laboratory	PC	4	0	0	4	2
7.	CS8491	Computer Architecture	PC	3	3	0	0	3
8.	CS8492	Database Management Systems	PC	3	3	0	0	3
9.	CS8451	Design and Analysis of Algorithms	PC	3	3	0	0	3
10.	CS8493	Operating Systems	PC	3	3	0	0	3
11.	CS8494	Software Engineering	PC	3	3	0	0	3
12.	CS8481	Database Management Systems Laboratory	PC	4	0	0	4	2
13.	CS8461	Operating Systems Laboratory	PC	4	0	0	4	2
14.	CS8591	Computer Networks	PC	3	3	0	0	3
15.	EC8691	Microprocessors and Microcontrollers	PC	3	3	0	0	3
16.	CS8501	Theory of Computation	PC	3	3	0	0	3
17.	CS8592	Object Oriented Analysis and Design	PC	3	3	0	0	3
18.	EC8681	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
19.	CS8582	Object Oriented Analysis and Design Laboratory	PC	4	0	0	4	2
20.	CS8581	Networks Laboratory	PC	4	0	0	4	2
21.	CS8651	Internet Programming	PC	3	3	0	0	3
22.	CS8691	Artificial Intelligence	PC	3	3	0	0	3
23.	CS8601	Mobile Computing	PC	3	3	0	0	3
24.	CS8602	Compiler Design	PC	5	3	0	2	4
25.	CS8603	Distributed Systems	PC	3	3	0	0	3
26.	CS8661	Internet Programming Laboratory	PC	4	0	0	4	2
27.	CS8662	Mobile Application Development Laboratory	PC	4	0	0	4	2
28.	CS8792	Cryptography and Network Security	PC	3	3	0	0	3
29.	CS8791	Cloud Computing	PC	3	3	0	0	3
30.	CS8711	Cloud Computing Laboratory	PC	4	0	0	4	2
31.	IT8761	Security Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE)

SEMESTER VI
ELECTIVE - I

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8075	Data Warehousing and Data Mining	PE	3	3	0	0	3
2.	IT8076	Software Testing	PE	3	3	0	0	3
3.	IT8072	Embedded Systems	PE	3	3	0	0	3
4.	CS8072	Agile Methodologies	PE	3	3	0	0	3
5.	CS8077	Graph Theory and Applications-	PE	3	3	0	0	3
6.	IT8071	Digital Signal Processing	PE	3	3	0	0	3
7.	GE8075	Intellectual Property Rights	PE	3	3	0	0	3

SEMESTER VII
ELECTIVE - II

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8091	Big Data Analytics	PE	3	3	0	0	3
2.	CS8082	Machine Learning Techniques	PE	3	3	0	0	3
3.	CS8092	Computer Graphics and Multimedia	PE	3	3	0	0	3
4.	IT8075	Software Project Management	PE	3	3	0	0	3
5.	CS8081	Internet of Things	PE	3	3	0	0	3
6.	IT8074	Service Oriented Architecture	PE	3	3	0	0	3
7.	GE8077	Total Quality Management	PE	3	3	0	0	3

SEMESTER VII
ELECTIVE - III

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8083	Multi-core Architectures and Programming	PE	3	3	0	0	3
2.	CS8079	Human Computer Interaction	PE	3	3	0	0	3
3.	CS8073	C# and .Net Programming	PE	3	3	0	0	3
4.	CS8088	Wireless Adhoc and Sensor Networks	PE	3	3	0	0	3
5.	CS8071	Advanced Topics on Databases	PE	3	3	0	0	3
6.	GE8072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3
7.	GE8074	Human Rights	PE	3	3	0	0	3
8.	GE8071	Disaster Management	PE	3	3	0	0	3

SEMESTER VIII
ELECTIVE - IV

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EC8093	Digital Image Processing	PE	3	3	0	0	3
2.	CS8085	Social Network Analysis	PE	3	3	0	0	3
3.	IT8073	Information Security	PE	3	3	0	0	3
4.	CS8087	Software Defined Networks	PE	3	3	0	0	3
5.	CS8074	Cyber Forensics	PE	3	3	0	0	3
6.	CS8086	Soft Computing	PE	3	3	0	0	3
7.	GE8076	Professional Ethics in Engineering	PE	3	3	0	0	3

SEMESTER VIII
ELECTIVE - V

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8080	Information Retrieval Techniques	PE	3	3	0	0	3
2.	CS8078	Green Computing	PE	3	3	0	0	3
3.	CS8076	GPU Architecture and Programming	PE	3	3	0	0	3
4.	CS8084	Natural Language Processing	PE	3	3	0	0	3
5.	CS8001	Parallel Algorithms	PE	3	3	0	0	3
6.	IT8077	Speech Processing	PE	3	3	0	0	3
7.	GE8073	Fundamentals of Nanoscience	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8381	Interpersonal Skills/Listening & Speaking	EEC	2	0	0	2	1
2.	HS8461	Advanced Reading and Writing	EEC	2	0	0	2	1
3.	CS8611	Mini Project	EEC	2	0	0	2	1
4.	HS8581	Professional Communication	EEC	2	0	0	2	1
5.	CS8811	Project Work	EEC	20	0	0	20	10

SUMMARY

S.NO.	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL	Percentage
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	4	7					3		14	7.60%
2.	BS	12	7	4	4	4				31	16.8%
3.	ES	9	5	9						23	12.5%
4.	PC		5	10	19	18	20	10		82	44.5%
5.	PE						3	6	6	15	8.15%
6.	OE					3		3		6	3.3%
7.	EEC			1	1		2		10	14	7.65%
	Total	25	24	24	24	25	25	22	16	185	
8.	Non Credit / Mandatory										

HS8151	COMMUNICATIVE ENGLISH	L	T	P	C
		4	0	0	4

OBJECTIVES:

To develop the basic reading and writing skills of first year engineering and technology students.

To help learners develop their listening skills, which will, enable them listen to lectures and comprehend them by asking questions; seeking clarifications.

To help learners develop their speaking skills and speak fluently in real contexts.

To help learners develop vocabulary of a general kind by developing their reading skills

UNIT I SHARING INFORMATION RELATED TO ONESELF/FAMILY& FRIENDS 12

Reading- short comprehension passages, practice in skimming-scanning and predicting- **Writing**- completing sentences- - developing hints. **Listening**- short texts- short formal and informal conversations. **Speaking-** introducing oneself - exchanging personal information- **Language development**- Wh- Questions- asking and answering-yes or no questions- parts of speech. **Vocabulary development-**- prefixes- suffixes- articles.- count/ uncount nouns.

UNIT II GENERAL READING AND FREE WRITING 12

Reading - comprehension-pre-reading-post reading- comprehension questions (multiple choice questions and /or short questions/ open-ended questions)-inductive reading- short narratives and descriptions from newspapers including dialogues and conversations (also used as short Listening texts)- register- **Writing** – paragraph writing- topic sentence- main ideas- free writing, short narrative descriptions using some suggested vocabulary and structures –**Listening**- telephonic conversations. **Speaking –** sharing information of a personal kind—greeting – taking leave- **Language development** – prepositions, conjunctions **Vocabulary development-** guessing meanings of words in context.

UNIT III GRAMMAR AND LANGUAGE DEVELOPMENT 12

Reading- short texts and longer passages (close reading) **Writing-** understanding text structure- use of reference words and discourse markers-coherence-jumbled sentences **Listening** – listening to longer texts and filling up the table- product description- narratives from different sources. **Speaking**- asking about routine actions and expressing opinions. **Language development**- degrees of comparison- pronouns- direct vs indirect questions- **Vocabulary development –** single word substitutes- adverbs.

UNIT IV READING AND LANGUAGE DEVELOPMENT 12

Reading- comprehension-reading longer texts- reading different types of texts- magazines **Writing**- letter writing, informal or personal letters-e-mails-conventions of personal email- **Listening**- listening to dialogues or conversations and completing exercises based on them. **Speaking-** speaking about oneself- speaking about one's friend- **Language development-**Tenses- simple present-simple past- present continuous and past continuous- **Vocabulary development**- synonyms-antonyms- phrasal verbs

UNIT V EXTENDED WRITING **12**

Reading- longer texts- close reading –**Writing**- brainstorming -writing short essays **–** developing an outline- identifying main and subordinate ideas- dialogue writing-**Listening** – listening to talks-conversations- **Speaking –** participating in conversations- short group conversations-**Language development**-modal verbs- present/ past perfect tense - **Vocabulary development**-collocations-fixed and semi-fixed expressions.

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Read articles of a general kind in magazines and newspapers.

Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.

Comprehend conversations and short talks delivered in English

Write short essays of a general kind and personal letters and emails in English.

TEXT BOOKS:

Board of Editors. **Using English** A Coursebook for Undergarduate Engineers and Technologists**.** Orient BlackSwan Limited, Hyderabad: 2015

Richards, C. Jack. **Interchange Students' Book-2** New Delhi: CUP, 2015.

REFERENCES:

Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge,2011.

Means,L. Thomas and Elaine Langlois. English & Communication For Colleges. CengageLearning ,USA: 2007

Redston, Chris &Gillies Cunningham Face2Face (Pre-intermediate Student's Book& Workbook) Cambridge University Press, New Delhi: 2005

Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011

Dutt P. Kiranmai and Rajeevan Geeta. Basic Communication Skills, Foundation Books: 2013.

MA8151 ENGINEERING MATHEMATICS – I LTPC 4004

OBJECTIVES :

The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT I DIFFERENTIAL CALCULUS **12**

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maximum and Minimum of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT III INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

UNIT V DIFFERENTIAL EQUATIONS 12

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients - Method of undetermined coefficients.

TOTAL: 60 PERIODS

OUTCOMES:

After completing this course, students should demonstrate competency in the following skills:

Use both the limit definition and rules of differentiation to differentiate functions. Apply differentiation to solve maxima and minima problems.

Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.

Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.

Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.

Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.

Apply various techniques in solving differential equations.

TEXT BOOKS :

Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015. [For Units I & III - Sections 1.1, 2.2, 2.3, 2.5, 2.7(Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1(Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES:

Anton, H, Bivens, I and Davis, S, "Calculus", Wiley, 10th Edition, 2016.

Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.

3. Narayanan, S. and Manicavachagom Pillai, T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.

Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.

Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016.

PH8151	ENGINEERING PHYSICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I PROPERTIES OF MATTER 9

Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT II WAVES AND FIBER OPTICS 9

Oscillatory motion – forced and damped oscillations: differential equation and its solution – plane progressive waves – wave equation. Lasers : population of energy levels, Einstein's A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – losses associated with optical fibers - fibre optic sensors: pressure and displacement.

UNIT III THERMAL PHYSICS 9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conduction, convection and radiation – heat conductions in solids – thermal conductivity - Forbe's and Lee's disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT IV QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunnelling (qualitative) - scanning tunnelling microscope.

UNIT V CRYSTAL PHYSICS 9

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults – role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of this course,

The students will gain knowledge on the basics of properties of matter and its applications,

The students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,

The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,

The students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and

The students will understand the basics of crystals, their structures and different crystal growth techniques.

TEXT BOOKS:

Bhattacharya, D.K. & Poonam, T. “Engineering Physics”. Oxford University Press, 2015.

Gaur, R.K. & Gupta, S.L. “Engineering Physics”. Dhanpat Rai Publishers, 2012.

Pandey, B.K. & Chaturvedi, S. “Engineering Physics”. Cengage Learning India, 2012.

REFERENCES:

Halliday, D., Resnick, R. & Walker, J. “Principles of Physics”. Wiley, 2015.

Serway, R.A. & Jewett, J.W. “Physics for Scientists and Engineers”. Cengage Learning, 2010.

Tipler, P.A. & Mosca, G. “Physics for Scientists and Engineers with Modern Physics’. W.H.Freeman, 2007.

CY8151 ENGINEERING CHEMISTRY L T P C
3 0 0 3

OBJECTIVES:

To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.

To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.

Preparation, properties and applications of engineering materials.

Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT I WATER AND ITS TREATMENT 9

Hardness of water – types – expression of hardness – units – estimation of hardness of water by EDTA – numerical problems – boiler troubles (scale and sludge) – treatment of boiler feed water – Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) external treatment – Ion exchange process, zeolite process – desalination of brackish water - Reverse Osmosis.

UNIT II SURFACE CHEMISTRY AND CATALYSIS 9

Adsorption: Types of adsorption – adsorption of gases on solids – adsorption of solute from solutions – adsorption isotherms – Freundlich’s adsorption isotherm – Langmuir’s adsorption isotherm – contact theory – kinetics of surface reactions, unimolecular reactions, Langmuir - applications of adsorption on pollution abatement. Catalysis: Catalyst – types of catalysis – criteria – autocatalysis – catalytic poisoning and catalytic promoters - acid base catalysis – applications (catalytic convertor) – enzyme catalysis– Michaelis – Menten equation.

UNIT III ALLOYS AND PHASE RULE 9

Alloys: Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Nichrome and stainless steel (18/8) – heat treatment of steel. Phase rule: Introduction, definition of terms with examples, one component system -water system - reduced phase rule - thermal analysis and cooling curves - two component systems - lead-silver system - Pattinson process.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - manufacture of synthetic petrol (Bergius process) - knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - power alcohol and biodiesel. Combustion of fuels: Introduction - calorific value - higher and lower calorific values- theoretical calculation of calorific value - ignition temperature - spontaneous ignition temperature - explosive range - flue gas analysis (ORSAT Method).

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant - breeder reactor - solar energy conversion - solar cells - wind energy. Batteries, fuel cells and supercapacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells – H_2-O_2 fuel cell.

TOTAL: 45 PERIODS

OUTCOMES:

The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

S. S. Dara and S. S. Umare, “A Textbook of Engineering Chemistry”, S. Chand & Company LTD, New Delhi, 2015

P. C. Jain and Monika Jain, “Engineering Chemistry” Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015

S. Vairam, P. Kalyani and Suba Ramesh, “Engineering Chemistry”, Wiley India PVT, LTD, New Delhi, 2013.

REFERENCES:

Friedrich Emich, “Engineering Chemistry”, Scientific International PVT, LTD, New Delhi, 2014.

Prasanta Rath, “Engineering Chemistry”, Cengage Learning India PVT, LTD, Delhi, 2015.

Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, 2015.

GE8151 PROBLEM SOLVING AND PYTHON PROGRAMMING LTPC
3 003

OBJECTIVES:

To know the basics of algorithmic problem solving

To read and write simple Python programs.

To develop Python programs with conditionals and loops.

To define Python functions and call them.

To use Python data structures –- lists, tuples, dictionaries.

To do input/output with files in Python.

UNIT I ALGORITHMIC PROBLEM SOLVING 9

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices,

immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

Develop algorithmic solutions to simple computational problems
Read, write, execute by hand simple Python programs.
Structure simple Python programs for solving problems.
Decompose a Python program into functions.
Represent compound data using Python lists, tuples, dictionaries.
Read and write data from/to files in Python Programs.

TEXT BOOKS:

Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013

Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.

Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.

Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.

Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.

Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC, 2013.

GE8152 ENGINEERING GRAPHICS L T P C

2 0 4 4

OBJECTIVES:

To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.

T o expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination) 1

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and

dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING 7+12

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 5+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 5+12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6 +12

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method .

TOTAL: 90 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to:

Familiarize with the fundamentals and standards of Engineering graphics

Perform freehand sketching of basic geometrical constructions and multiple views of objects.

Project orthographic projections of lines and plane surfaces.

Draw projections and solids and development of surfaces.

Visualize and to project isometric and perspective sections of simple solids.

TEXT BOOKS:

Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.

Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2008.

REFERENCES:

Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.

Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2007.

Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

N. S. Parthasarathy and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.

Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.

Publication of Bureau of Indian Standards:

IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.

IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.

IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.

IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.

IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

There will be five questions, each of either or type covering all units of the syllabus.

All questions will carry equal marks of 20 each making a total of 100.

The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.

The examination will be conducted in appropriate sessions on the same day

GE8161 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C
0042

OBJECTIVES:

To write, test, and debug simple Python programs.

To implement Python programs with conditionals and loops. Use functions for structuring Python programs.

Represent compound data using Python lists, tuples, dictionaries. Read and write data from/to files in Python.

LIST OF PROGRAMS:

Compute the GCD of two numbers.
Find the square root of a number (Newton’s method)
Exponentiation (power of a number)
Find the maximum of a list of numbers
Linear search and Binary search
Selection sort, Insertion sort
Merge sort
First n prime numbers
Multiply matrices
Programs that take command line arguments (word count)
Find the most frequent words in a text read from a file
Simulate elliptical orbits in Pygame
Simulate bouncing ball using Pygame

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to:

Write, test, and debug simple Python programs.

Implement Python programs with conditionals and loops.

Develop Python programs step-wise by defining functions and calling them.

Use Python lists, tuples, dictionaries for representing compound data. Read and write data from/to files in Python.

BS8161 **PHYSICS AND CHEMISTRY LABORATORY** **L T P C**

(Common to all branches of B.E. / B.Tech Programmes) **0 0 4 2**

OBJECTIVES:

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

Determination of rigidity modulus – Torsion pendulum
Determination of Young's modulus by non-uniform bending method
(a) Determination of wavelength, and particle size using Laser
(b) Determination of acceptance angle in an optical fiber.
Determination of thermal conductivity of a bad conductor – Lee's Disc method.
Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
Determination of wavelength of mercury spectrum – spectrometer grating
Determination of band gap of a semiconductor
Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

Apply principles of elasticity, optics and thermal properties for engineering applications.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:

To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

To acquaint the students with the determination of molecular weight of a polymer by viscometery.

Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
Determination of total, temporary & permanent hardness of water by EDTA method.
Determination of DO content of water sample by Winkler's method.
Determination of chloride content of water sample by argentometric method.
Estimation of copper content of the given solution by Iodometry.
Determination of strength of given hydrochloric acid using pH meter.
Determination of strength of acids in a mixture of acids using conductivity meter.
Estimation of iron content of the given solution using potentiometer.
Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).
Estimation of sodium and potassium present in water using flame photometer.
Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
Pseudo first order kinetics-ester hydrolysis.
Corrosion experiment-weight loss method.
Determination of CMC.
Phase change in a solid.

16. Conductometric titration of strong acid vs strong base.

OUTCOMES:

The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

TOTAL: 30 PERIODS

TEXTBOOK:

1. Vogel's Textbook of Quantitative Chemical Analysis (8^{TH} edition, 2014).

HS8251	TECHNICAL ENGLISH	L	T	P	C
		4	0	0	4

OBJECTIVES:

The Course prepares second semester engineering and Technology students to:

Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.

Foster their ability to write convincing job applications and effective reports.

Develop their speaking skills to make technical presentations, participate in group discussions.

Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialization.

UNIT I INTRODUCTION TECHNICAL ENGLISH 12

Listening- Listening to talks mostly of a scientific/technical nature and completing information-gap exercises- **Speaking** –Asking for and giving directions- **Reading** – reading short technical texts from journals- newsapapers- **Writing**- purpose statements – extended definitions – issue- writing instructions – checklists-recommendations-**Vocabulary Development**- technical vocabulary **Language Development** –subject verb agreement - compound words.

UNIT II READING AND STUDY SKILLS 12

Listening- Listening to longer technical talks and completing exercises based on them-**Speaking** – describing a process-**Reading** – reading longer technical texts- identifying the various transitions in a text- paragraphing- **Writing**- interpreting cgarts, graphs- **Vocabulary Development-** vocabulary used in formal letters/emails and reports **Language Development-** impersonal passive voice, numerical adjectives.

UNIT III TECHNICAL WRITING AND GRAMMAR 12

Listening- Listening to classroom lectures/ talkls on engineering/technology -**Speaking** – introduction to technical presentations- **Reading** – longer texts both general and technical, practice in speed reading; **Writing**-Describing a process, use of sequence words- **Vocabulary Development-** sequence words- Misspelled words. **Language Development-** embedded sentences

UNIT IV REPORT WRITING 12

Listening- Listening to documentaries and making notes. **Speaking** – mechanics of presentations- **Reading** – reading for detailed comprehension- **Writing**- email etiquette- job application – cover letter –Résumé preparation(via email and hard copy)- analytical essays and issue based essays--**Vocabulary Development**- finding suitable synonyms-paraphrasing-. **Language Development-** clauses- if conditionals.

UNIT V GROUP DISCUSSION AND JOB APPLICATIONS **12**

Listening- TED/Ink talks; **Speaking** –participating in a group discussion -**Reading**– reading and understanding technical articles **Writing**– Writing reports- minutes of a meeting- accident and survey-**Vocabulary Development- verbal analogies Language Development-** reported speech.

TOTAL :60 PERIODS

OUTCOMES:

At the end of the course learners will be able to:

Read technical texts and write area- specific texts effortlessly.

Listen and comprehend lectures and talks in their area of specialisation successfully.

Speak appropriately and effectively in varied formal and informal contexts.

Write reports and winning job applications.

TEXT BOOKS:

Board of editors. **Fluency in English A Course book for Engineering and Technology.** Orient Blackswan, Hyderabad: 2016

Sudharshana.N.P and Saveetha. C. **English for Technical Communication**. Cambridge University Press: New Delhi, 2016.

REFERENCES:

Raman, Meenakshi and Sharma, Sangeetha- **Technical Communication Principles and Practice.**Oxford University Press: New Delhi,2014.

Kumar, Suresh. E. **Engineering English**. Orient Blackswan: Hyderabad,2015

Booth-L. Diana**, Project Work,** Oxford University Press**,** Oxford: 2014.

Grussendorf, Marion, **English for Presentations,** Oxford University Press, Oxford: 2007

Means, L. Thomas and Elaine Langlois, **English & Communication For Colleges.** Cengage Learning, USA: 2007

Students can be asked to read Tagore, Chetan Bhagat and for supplementary reading.

MA8251 ENGINEERING MATHEMATICS – II **L T P C**
4 0 0 4

OBJECTIVES:

This course is designed to cover topics such as Matrix Algebra, Vector Calculus, Complex Analysis and Laplace Transform. Matrix Algebra is one of the powerful tools to handle practical problems arising in the field of engineering. Vector calculus can be widely used for modelling the various laws of physics. The various methods of complex analysis and Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT I MATRICES **12**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II VECTOR CALCULUS **12**

Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTIONS **12**

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions w z c, cz, $\frac{1}{z}$, z^2 - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION **12**

Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour.

UNIT V LAPLACE TRANSFORMS **12**

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

TOTAL: 60 PERIODS

OUTCOMES :

After successfully completing the course, the student will have a good understanding of the following topics and their applications:

Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.

Gradient, divergence and curl of a vector point function and related identities.

Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.

Analytic functions, conformal mapping and complex integration.

Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

TEXT BOOKS:

Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

2. Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2016.

REFERENCES :

Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.

Jain R.K. and Iyengar S.R.K., " Advanced Engineering Mathematics ", Narosa Publications, New Delhi , 3rd Edition, 2007.

3. O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.
4. Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4tn Edition, New Delhi, 2014.

Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

		L	T	P	C
PH8252	**PHYSICS FOR INFORMATION SCIENCE** (Common to CSE & IT)	**3**	**0**	**0**	**3**

OBJECTIVES:

To understand the essential principles of Physics of semiconductor device and Electron transport properties. Become proficient in magnetic and optical properties of materials and Nano-electronic devices.

UNIT I ELECTRICAL PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - electrons in metals – Particle in a three dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole.

UNIT II SEMICONDUCTOR PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration – Carrier transport in Semiconductor: random motion, drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.

UNIT III MAGNETIC PROPERTIES OF MATERIALS 9

Magnetic dipole moment – atomic magnetic moments- magnetic permeability and susceptibility - Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism – antiferromagnetism – ferrimagnetism – Ferromagnetism: origin and exchange interaction-saturation magnetization and Curie temperature – Domain Theory- M versus H behaviour – Hard and soft magnetic materials – examples and uses-– Magnetic principle in computer data storage – Magnetic hard disc (GMR sensor).

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) - photo current in a P-N diode – solar cell - LED – Organic LED – Laser diodes – Optical data storage techniques.

UNIT V NANO DEVICES 9

Electron density in bulk material – Size dependence of Fermi energy – Quantum confinement – Quantum structures – Density of states in quantum well, quantum wire and quantum dot structure

Band gap of nanomaterials – Tunneling: single electron phenomena and single electron transistor – Quantum dot laser. Conductivity of metallic nanowires – Ballistic transport – Quantum resistance and conductance – Carbon nanotubes: Properties and applications .

TOTAL :45 PERIODS

OUTCOMES:

At the end of the course, the students will able to

Gain knowledge on classical and quantum electron theories, and energy band structuues,
Acquire knowledge on basics of semiconductor physics and its applications in various devices,
Get knowledge on magnetic properties of materials and their applications in data storage, Have the necessary understanding on the functioning of optical materials for optoelectronics,
Understand the basics of quantum structures and their applications in carbon electronics..

TEXT BOOKS:

Jasprit Singh, “Semiconductor Devices: Basic Principles”, Wiley 2012.
Kasap, S.O. “Principles of Electronic Materials and Devices”, McGraw-Hill Education, 2007.
Kittel, C. “Introduction to Solid State Physics”. Wiley, 2005.

REFERENCES:

Garcia, N. & Damask, A. “Physics for Computer Science Students”. Springer-Verlag, 2012.
Hanson, G.W. “Fundamentals of Nanoelectronics”. Pearson Education, 2009.
Rogers, B., Adams, J. & Pennathur, S. “Nanotechnology: Understanding Small Systems”. CRC Press, 2014.

BE8255	BASIC ELECTRICAL, ELECTRONICS AND MEASUREMENT ENGINEERING	LTPC 3 003

OBJECTIVES:

To understand the fundamentals of electronic circuit constructions.

To learn the fundamental laws, theorems of electrical circuits and also to analyze them To study the basic principles of electrical machines and their performance

To study the different energy sources, protective devices and their field applications

To understand the principles and operation of measuring instruments and transducers

UNIT I ELECTRICAL CIRCUITS ANALYSIS 9

Ohms Law, Kirchhoff’s Law-Instantaneous power- series and parallel circuit analysis with resistive, capacitive and inductive network - nodal analysis, mesh analysis- network theorems - Thevenins theorem, Norton theorem, maximum power transfer theorem and superposition theorem, three phase supply-Instantaneous, Reactive and apparent power-star delta conversion.

UNIT II ELECTRICAL MACHINES 9

DC and AC ROTATING MACHINES:Types, Construction, principle, Emf and torque equation, application Speed Control- Basics of Stepper Motor – Brushless DC motors- Transformers-Introduction- types and construction, working principle of Ideal transformer-Emf equation- All day efficiency calculation.

UNIT III UTILIZATION OF ELECTRICAL POWER 9 Renewable energy sources-wind and solar panels. Illumination by lamps- Sodium Vapour,

Mercury vapour, Fluorescent tube. Domestic refrigerator and air conditioner-Electric circuit, construction and working principle. Batteries-NiCd, Pb Acid and Li ion–Charge and Discharge Characteristics. Protection-need for earthing, fuses and circuit breakers.Energy Tariff calculation for domestic loads.

UNIT IV ELECTRONIC CIRCUITS 9

PN Junction-VI Characteristics of Diode, zener diode, Transistors configurations - amplifiers. Op amps- Amplifiers, oscillator,rectifiers, differentiator, integrator, ADC, DAC. Multi vibrator using 555 Timer IC . Voltage regulator IC using LM 723,LM 317.

UNIT V ELECTRICAL MEASUREMENT 9

Characteristic of measurement-errors in measurement, torque in indicating instruments- moving coil and moving iron meters, Energy meter and watt meter. Transducers- classification-thermo electric, RTD, Strain gauge, LVDT, LDR and piezoelectric. Oscilloscope-CRO.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Discuss the essentials of electric circuits and analysis.

Discuss the basic operation of electric machines and transformers Introduction of renewable sources and common domestic loads.

Introduction to measurement and metering for electric circuits.

TEXT BOOKS:

1. D.P. Kotharti and I.J Nagarath, Basic Electrical and Electronics Engineering, Mc Graw Hill, 2016,Third Edition.
2. M.S. Sukhija and T.K. Nagsarkar, Basic Electrical and Electronic Engineering, Oxford, 2016.

REFERENCES:

S.B. Lal Seksena and Kaustuv Dasgupta, Fundaments of Electrical Engineering, Cambridge, 2016

2. B.L Theraja, Fundamentals of Electrical Engineering and Electronics. Chand Co, 2008.

S.K.Sahdev, Basic of Electrical Engineering, Pearson, 2015

John Bird, —Electrical and Electronic Principles and Technologyll, Fourth Edition, Elsevier, 2010.

Mittle,Mittal, Basic Electrical Engineering**ll, 2nd Edition, Tata McGraw**-Hill Edition, 2016.

C.L.Wadhwa, "Generation, Distribution and Utilisation of Electrical Energy", New Age international pvt.ltd.,2003.

GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING LTPC
3 0 0 3

OBJECTIVES:

To study the nature and facts about environment.

To finding and implementing scientific, technological, economic and political solutions to environmental problems.

To study the interrelationship between living organism and environment.

To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.

To study the dynamic processes and understand the features of the earth**"s interior and** surface.

To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7 From unsustainable to sustainable development – urban problems related to energy –

water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

Public awareness of environmental is at infant stage.

Ignorance and incomplete knowledge has lead to misconceptions

Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS:

Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.

Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCES :

Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD,New Delhi, 2007.

Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) PVT, LTD, Hydrabad, 2015.

Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.

G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.

CS8251 PROGRAMMING IN C LTPC 3003

OBJECTIVES:

To develop C Programs using basic programming constructs To develop C programs using arrays and strings

To develop applications in C using functions , pointers and structures To do input/output and file handling in C

UNIT I BASICS OF C PROGRAMMING 9

Introduction to programming paradigms - Structure of C program - C programming: Data Types – Storage classes - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Pre-processor directives - Compilation process

UNIT II ARRAYS AND STRINGS 9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program**:** Computing Mean, Median and Mode - Two dimensional arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String operations: length, compare, concatenate, copy – Selection sort, linear and binary search

UNIT III FUNCTIONS AND POINTERS 9

Introduction to functions: Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions – Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference

UNIT IV STRUCTURES 9

Structure - Nested structures – Pointer and Structures – Array of structures – Example Program using structures and pointers – Self referential structures – Dynamic memory allocation - Singly linked list - typedef

UNIT V FILE PROCESSING 9

Files – Types of file processing: Sequential access, Random access – Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Transaction processing using random access files – Command line arguments

OUTCOMES:

Upon completion of the course, the students will be able to

Develop simple applications in C using basic constructs

Design and implement applications using arrays and strings

Develop and implement applications in C using functions and pointers. Develop applications in C using structures.

Design applications using sequential and random access file processing.

TEXT BOOKS:

Reema Thareja, “Programming in C”, Oxford University Press, Second Edition, 2016.

Kernighan, B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2006

REFERENCES:

Paul Deitel and Harvey Deitel, “C How to Program”, Seventh edition, Pearson Publication

Juneja, B. L and Anita Seth, “Programming in C”, CENGAGE Learning India pvt. Ltd., 2011

Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, First Edition, Oxford University Press, 2009.
Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C",McGraw-Hill Education, 1996.

GE8261 ENGINEERING PRACTICES LABORATORY L T P C
0 0 4 2

OBJECTIVES:

To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE 13

BUILDINGS:

Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

PLUMBING WORKS:

Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
Study of pipe connections requirements for pumps and turbines.
Preparation of plumbing line sketches for water supply and sewage works.
Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

CARPENTRY USING POWER TOOLS ONLY:

Study of the joints in roofs, doors, windows and furniture.
Hands-on-exercise:
Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE 18

WELDING:

Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
Gas welding practice

BASIC MACHINING:

Simple Turning and Taper turning
Drilling Practice

SHEET METAL WORK:

Forming & Bending:
Model making – Trays and funnels.
Different type of joints.

MACHINE ASSEMBLY PRACTICE:

(a) Study of centrifugal pump

(b) Study of air conditioner

DEMONSTRATION ON:

Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
Foundry operations like mould preparation for gear and step cone pulley.
Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 13

Residential house wiring using switches, fuse, indicator, lamp and energy meter.
Fluorescent lamp wiring.
Stair case wiring
Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
Measurement of energy using single phase energy meter.
Measurement of resistance to earth of an electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE 16

Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
Study of logic gates AND, OR, EX-OR and NOT.
Generation of Clock Signal.
Soldering practice – Components Devices and Circuits – Using general purpose PCB.

Measurement of ripple factor of HWR and FWR.

TOTAL: 60 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

Fabricate carpentry components and pipe connections including plumbing works.
Use welding equipments to join the structures.
Carry out the basic machining operations
Make the models using sheet metal works
Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings
Carry out basic home electrical works and appliances
Measure the electrical quantities
Elaborate on the components, gates, soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	15 Sets.
2. Carpentry vice (fitted to work bench)	15 Nos.
3. Standard woodworking tools	15 Sets.
4. Models of industrial trusses, door joints, furniture joints	5 each
5. Power Tools: (a) Rotary Hammer	2 Nos
(b) Demolition Hammer	2 Nos
(c) Circular Saw	2 Nos
(d) Planer	2 Nos
(e) Hand Drilling Machine	2 Nos
(f) Jigsaw	2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders	5 Nos.

2. Welding booth with exhaust facility	5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos.
5. Centre lathe	2 Nos.
6. Hearth furnace, anvil and smithy tools	2 Sets.
7. Moulding table, foundry tools	2 Sets.
8. Power Tool: Angle Grinder	2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner	One each.

ELECTRICAL

1. Assorted electrical components for house wiring	15 Sets
2. Electrical measuring instruments	10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp	1 each
4. Megger (250V/500V)	1 No.
5. Power Tools: (a) Range Finder	2 Nos
(b) Digital Live-wire detector	2 Nos

ELECTRONICS

1. Soldering guns	10 Nos.
2. Assorted electronic components for making circuits	50 Nos.
3. Small PCBs	10 Nos.
4. Multimeters	10 Nos.
Study purpose items: Telephone, FM radio, low-voltage power supply	

CS8261 C PROGRAMMING LABORATORY LTPC
0 042

OBJECTIVES:

To develop programs in C using basic constructs.

To develop applications in C using strings, pointers, functions, structures.

To develop applications in C using file processing.

LIST OF EXPERIMENTS:

Programs using I/O statements and expressions.

Programs using decision-making constructs.

Write a program to find whether the given year is leap year or Not? (Hint: not every centurion year is a leap. For example 1700, 1800 and 1900 is not a leap year)

Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.

Check whether a given number is Armstrong number or not?

Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions.

5 if it is a perfect cube.

4 if it is a multiple of 4 and divisible by 6.

3 if it is a prime number.

Sort the numbers based on the weight in the increasing order as shown below <10,its weight>,<36,its weight><89,its weight>

Populate an array with height of persons and find how many persons are above the average height.

Populate a two dimensional array with height and weight of persons and compute the Body Mass Index of the individuals.

Given a string “a$bcd./fg” find its reverse without changing the position of special characters. (Example input:a@gh%;j and output:j@hg%;a)

Convert the given decimal number into binary, octal and hexadecimal numbers using user defined functions.

From a given paragraph perform the following using built-in functions:

Find the total number of words.

Capitalize the first word of each sentence.

Replace a given word with another word.

Solve towers of Hanoi using recursion.

Sort the list of numbers using pass by reference.

Generate salary slip of employees using structures and pointers.

Compute internal marks of students for five different subjects using structures and functions.

Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.

Count the number of account holders whose balance is less than the minimum balance using sequential access file.

Mini project

Create a "Railway reservation system" with the following modules

Booking
Availability checking
Cancellation
Prepare chart

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Develop C programs for simple applications making use of basic constructs, arrays and strings.

Develop C programs involving functions, recursion, pointers, and structures.

Design applications using sequential and random access file processing.

MA8351	DISCRETE MATHEMATICS	L	T	P	C
		4	0	0	4

OBJECTIVES:

To extend student's logical and mathematical maturity and ability to deal with abstraction.

To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

To understand the basic concepts of combinatorics and graph theory. To familiarize the applications of algebraic structures.

To understand the concepts and significance of lattices and boolean algebra which are widely used in computer science and engineering.

UNIT I LOGIC AND PROOFS 12

Propositional logic – Propositional equivalences - Predicates and quantifiers – Nested quantifiers – Rules of inference - Introduction to proofs – Proof methods and strategy.

UNIT II COMBINATORICS 12

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications

UNIT III GRAPHS 12

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.

UNIT IV ALGEBRAIC STRUCTURES 12 Algebraic systems – Semi groups and monoids - Groups – Subgroups – Homomorphism's –
Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields.

UNIT V LATTICES AND BOOLEAN ALGEBRA 12

Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra.

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, students would:

Have knowledge of the concepts needed to test the logic of a program.

Have an understanding in identifying structures on many levels.

Be aware of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.

Be aware of the counting principles.

Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.

TEXTBOOKS:

1. Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.

Tremblay, J.P. and Manohar.R, " Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCES:

Grimaldi, R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, Delhi, 2007.

Lipschutz, S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

Koshy, T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.

CS8351 DIGITAL PRINCIPLES AND SYSTEM DESIGN L TPC 4004

OBJECTIVES:

To design digital circuits using simplified Boolean functions

To analyze and design combinational circuits

To analyze and design synchronous and asynchronous sequential circuits

To understand Programmable Logic Devices

To write HDL code for combinational and sequential circuits

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 12

Number Systems - Arithmetic Operations - Binary Codes- Boolean Algebra and Logic Gates Theorems and Properties of Boolean Algebra - Boolean Functions - Canonical and Standard Forms - Simplification of Boolean Functions using Karnaugh Map - Logic Gates – NAND and NOR Implementations.

UNIT II COMBINATIONAL LOGIC 12

Combinational Circuits – Analysis and Design Procedures - Binary Adder-Subtractor - Decimal Adder - Binary Multiplier - Magnitude Comparator - Decoders – Encoders – Multiplexers - Introduction to HDL – HDL Models of Combinational circuits.

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC 12

Sequential Circuits - Storage Elements: Latches , Flip-Flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Registers and Counters - HDL Models of Sequential Circuits.

UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC 12

Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards.

UNIT V MEMORY AND PROGRAMMABLE LOGIC 12

RAM – Memory Decoding – Error Detection and Correction - ROM - Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices.

TOTAL : 60 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

Simplify Boolean functions using KMap

Design and Analyze Combinational and Sequential Circuits

Implement designs using Programmable Logic Devices

Write HDL code for combinational and Sequential Circuits

TEXT BOOK:

M. Morris R. Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog", 6th Edition, Pearson Education, 2017.

REFERENCES:

G. K. Kharate, Digital Electronics, Oxford University Press, 2010

John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017.

Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013

Donald D. Givone, Digital Principles and Design**l, Tata Mc Graw Hill, 2003.**

CS8391 DATA STRUCTURES LT PC 3003

OBJECTIVES:

To understand the concepts of ADTs

To Learn linear data structures – lists, stacks, and queues

To understand sorting, searching and hashing algorithms

To apply Tree and Graph structures

UNIT I LINEAR DATA STRUCTURES – LIST 9

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation —singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES 9

Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression - Queue ADT – Operations - Circular Queue – Priority Queue - deQueue – applications of queues.

UNIT III NON LINEAR DATA STRUCTURES – TREES 9

Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree **-** Heap – Applications of heap.

UNIT IV NON LINEAR DATA STRUCTURES - GRAPHS 9

Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES 9

Searching- Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Implement abstract data types for linear data structures.

Apply the different linear and non-linear data structures to problem solutions. Critically analyze the various sorting algorithms.

TEXT BOOKS:

Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education,1997.

Reema Thareja, “Data Structures Using C”, Second Edition , Oxford University Press, 2011

REFERENCES:

Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, “Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.

Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education,1983.

Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education.

Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008

CS8392 OBJECT ORIENTED PROGRAMMING LTPC

3 003

OBJECTIVES:

To understand Object Oriented Programming concepts and basic characteristics of Java To know the principles of packages, inheritance and interfaces

To define exceptions and use I/O streams

To develop a java application with threads and generics classes To design and build simple Graphical User Interfaces

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 10

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment **-** Java Source File -Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages - JavaDoc comments.

UNIT II INHERITANCE AND INTERFACES 9

Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending

interfaces - Object cloning -inner classes, Array Lists - Strings

UNIT III EXCEPTION HANDLING AND I/O 9

Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files

UNIT IV MULTITHREADING AND GENERIC PROGRAMMING 8

Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

UNIT V EVENT DRIVEN PROGRAMMING 9

Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes - actions - mouse events - AWT event hierarchy - Introduction to Swing – layout management - Swing Components – Text Fields , Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to:

Develop Java programs using OOP principles

Develop Java programs with the concepts inheritance and interfaces

Build Java applications using exceptions and I/O streams

Develop Java applications with threads and generics classes

Develop interactive Java programs using swings

TEXT BOOKS:

Herbert Schildt, “Java The complete reference”, 8th Edition, McGraw Hill Education, 2011.

Cay S. Horstmann, Gary cornell, “Core Java Volume –I Fundamentals”, 9th Edition, Prentice Hall, 2013.

REFERENCES:

Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015.

Steven Holzner, “Java 2 Black book”, Dreamtech press, 2011.

Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education, 2000.

EC8395 COMMUNICATION ENGINEERING LTPC

3 003

OBJECTIVES:

To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues

To study the various analog and digital modulation techniques

To study the principles behind information theory and coding To study the various digital communication techniques

UNIT I ANALOG MODULATION 9

Amplitude Modulation – AM, DSBSC, SSBSC, VSB – PSD, modulators and demodulators – Angle modulation – PM and FM – PSD, modulators and demodulators – Superheterodyne receivers

UNITII PULSE MODULATION 9

Low pass sampling theorem – Quantization – PAM – Line coding – PCM, DPCM, DM, and ADPCM And ADM, Channel Vocoder - Time Division Multiplexing, Frequency Division Multiplexing

UNIT III DIGITAL MODULATION AND TRANSMISSION 9

Phase shift keying – BPSK, DPSK, QPSK – Principles of M-ary signaling M-ary PSK & QAM – Comparison, ISI – Pulse shaping – Duo binary encoding – Cosine filters – Eye pattern, equalizers

UNIT IV INFORMATION THEORY AND CODING 9

Measure of information – Entropy – Source coding theorem – Shannon–Fano coding, Huffman Coding, LZ Coding – Channel capacity – Shannon-Hartley law – Shannon's limit – Error control codes – Cyclic codes, Syndrome calculation – Convolution Coding, Sequential and Viterbi decoding

UNIT V SPREAD SPECTRUM AND MULTIPLE ACCESS 9

PN sequences – properties – m-sequence – DSSS – Processing gain, Jamming – FHSS – Synchronisation and tracking – Multiple Access – FDMA, TDMA, CDMA,

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Ability to comprehend and appreciate the significance and role of this course in the present contemporary world

Apply analog and digital communication techniques.

Use data and pulse communication techniques.

Analyze Source and Error control coding.

TEXT BOOKS:

H Taub, D L Schilling, G Saha, “Principles of Communication Systems” 3/e, TMH 2007

S. Haykin “Digital Communications” John Wiley 2005

REFERENCES:

B.P.Lathi, “Modern Digital and Analog Communication Systems”, 3rd edition, Oxford University Press, 2007

H P Hsu, Schaum Outline Series – “Analog and Digital Communications” TMH 2006

B.Sklar, Digital Communications Fundamentals and Applications” 2/e Pearson Education 2007.

CS8381 DATA STRUCTURES LABORATORY LTPC

0 042

OBJECTIVES

To implement linear and non-linear data structures

To understand the different operations of search trees To implement graph traversal algorithms

To get familiarized to sorting and searching algorithms

Array implementation of Stack and Queue ADTs

Array implementation of List ADT

Linked list implementation of List, Stack and Queue ADTs

Applications of List, Stack and Queue ADTs

Implementation of Binary Trees and operations of Binary Trees

Implementation of Binary Search Trees

Implementation of AVL Trees

Implementation of Heaps using Priority Queues.

Graph representation and Traversal algorithms
Applications of Graphs
Implementation of searching and sorting algorithms
Hashing – any two collision techniques

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the students will be able to:

Write functions to implement linear and non-linear data structure operations

Suggest appropriate linear / non-linear data structure operations for solving a given problem

Appropriately use the linear / non-linear data structure operations for a given problem

Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval

CS8383 OBJECT ORIENTED PROGRAMMING LABORATORY LTPC
0 042

OBJECTIVES

To build software development skills using java programming for real-world applications.

To understand and apply the concepts of classes, packages, interfaces, arraylist, exception handling and file processing.

To develop applications using generic programming and event handling.

LIST OF EXPERIMENTS

Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e domestic or commercial). Compute the bill amount using the following tariff.

If the type of the EB connection is domestic, calculate the amount to be paid as follows:

- First 100 units - Rs. 1 per unit
- 101-200 units - Rs. 2.50 per unit
  201 -500 units - Rs. 4 per unit
- > 501 units - Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

- First 100 units - Rs. 2 per unit
- 101-200 units - Rs. 4.50 per unit
  201 -500 units - Rs. 6 per unit
- > 501 units - Rs. 7 per unit

Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.

Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.

Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementations.

Write a program to perform string operations using ArrayList. Write functions for the following

Append - add at end

Insert – add at particular index

Search

List all string starts with given letter

Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

Write a Java program to implement user defined exception handling.

Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

Write a java program to find the maximum value from the given type of elements using a generic function.

Design a calculator using event-driven programming paradigm of Java with the following options.

Decimal manipulations

Scientific manipulations

Develop a mini project for any application using Java concepts.

TOTAL : 60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to

Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.

Develop and implement Java programs with arraylist, exception handling and multithreading .

Design applications using file processing, generic programming and event handling.

CS8382 DIGITAL SYSTEMS LABORATORY L T P C 0042

OBJECTIVES:

To understand the various basic logic gates

To design and implement the various combinational circuits

To design and implement combinational circuits using MSI devices. To design and implement sequential circuits

To understand and code with HDL programming

LIST OF EXPERIMENTS

Verification of Boolean Theorems using basic gates.

Design and implementation of combinational circuits using basic gates for arbitrary

functions, code converters.
Design and implement Half/Full Adder and Subtractor.
Design and implement combinational circuits using MSI devices: 4 – bit binary adder / subtractor
Parity generator / checker
Magnitude Comparator
Application using multiplexers
Design and implement shift-registers.
Design and implement synchronous counters.
Design and implement asynchronous counters.
Coding combinational circuits using HDL.
Coding sequential circuits using HDL.
Design and implementation of a simple digital system (Mini Project).

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

Implement simplified combinational circuits using basic logic gates Implement combinational circuits using MSI devices
Implement sequential circuits like registers and counters
Simulate combinational and sequential circuits using HDL

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS HARDWARE:

Digital trainer kits - 30
Digital ICs required for the experiments in sufficient numbers

SOFTWARE:

1. HDL simulator.

		L	T	P	C
HS8381	**INTERPERSONAL SKILLS/LISTENING&SPEAKING**	**0**	**0**	**2**	**1**

OBJECTIVES:

The Course will enable learners to:

Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
improve general and academic listening skills
Make effective presentations.

UNIT I

Listening as a key skill- its importance- speaking - give personal information - ask for personal information - express ability - enquire about ability - ask for clarification Improving pronunciation - pronunciation basics taking lecture notes - preparing to listen to a lecture - articulate a complete idea as opposed to producing fragmented utterances.

UNIT II

Listen to a process information- give information, as part of a simple explanation - conversation starters: small talk - stressing syllables and speaking clearly - intonation patterns - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

UNIT III

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk - greet - respond to greetings - describe health and symptoms - invite and offer - accept - decline - take leave - listen for and follow the gist- listen for detail

UNIT IV

Being an active listener: giving verbal and non-verbal feedback - participating in a group discussion - summarizing academic readings and lectures conversational speech listening to and participating in conversations - persuade.

UNIT V

Formal and informal talk - listen to follow and respond to explanations, directions and instructions in academic and business contexts - strategies for presentations and interactive communication - group/pair presentations - negotiate disagreement in group work.

TOTAL :30PERIODS

OUTCOMES:

At the end of the course Learners will be able to:

Listen and respond appropriately.
Participate in group discussions
Make effective presentations
Participate confidently and appropriately in conversations both formal and informal

TEXT BOOKS:

Brooks,Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011.

Richards,C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010

REFERENCES:

Bhatnagar, Nitin and MamtaBhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.

Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.

Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.

Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.

Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford, 2014

MA8402	PROBABILITY AND QUEUING THEORY	L	T	P	C
		4	0	0	4

OBJECTIVES:

To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.

To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.

To understand the basic concepts of random processes which are widely used in IT fields.
To understand the concept of queueing models and apply in engineering.

To understand the significance of advanced queueing models.

To provide the required mathematical support in real life problems and develop probabilistic models which can be used in several areas of science and engineering.

UNIT I PROBABILITY AND RANDOM VARIABLES 12

Probability – Axioms of probability – Conditional probability – Baye's theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

UNIT II TWO - DIMENSIONAL RANDOM VARIABLES 12

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III RANDOM PROCESSES 12

Classification – Stationary process – Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations – Limiting distributions.

UNIT IV QUEUEING MODELS 12

Markovian queues – Birth and death processes – Single and multiple server queueing models – Little's formula - Queues with finite waiting rooms – Queues with impatient customers : Balking and reneging.

UNIT V ADVANCED QUEUEING MODELS 12

Finite source models - M/G/1 queue – Pollaczek Khinchin formula - M/D/1 and $M/E_K/1$ as special cases – Series queues – Open Jackson networks.

TOTAL : 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students should be able to:

Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.

Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.

Apply the concept of random processes in engineering disciplines. Acquire skills in analyzing queueing models.

Understand and characterize phenomenon which evolve with respect to time in a probabilistic manner

TEXTBOOKS:

Gross, D., Shortle, J.F, Thompson, J.M and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student 4th Edition, 2014.

Ibe, O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007.

REFERENCES :

Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2004.

Taha, H.A., "Operations Research", 9th Edition, Pearson India Education Services, Delhi, 2016.

Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", 2nd Edition, John Wiley and Sons, 2002.

Yates, R.D. and Goodman. D. J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.

CS8491	COMPUTER ARCHITECTURE	L	TP		C
		3	0	0	3

OBJECTIVES:

To learn the basic structure and operations of a computer.

To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.

To learn the basics of pipelined execution.

To understand parallelism and multi-core processors.

To understand the memory hierarchies, cache memories and virtual memories.

To learn the different ways of communication with I/O devices.

UNIT I BASIC STRUCTURE OF A COMPUTER SYSTEM 9

Functional Units – Basic Operational Concepts – Performance – Instructions: Language of the Computer – Operations, Operands – Instruction representation – Logical operations – decision making – MIPS Addressing.

UNIT II ARITHMETIC FOR COMPUTERS 9

Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism

UNIT III PROCESSOR AND CONTROL UNIT 9

A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions.

UNIT IV PARALLELISIM 9

Parallel processing challenges – Flynn's classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

UNIT V MEMORY & I/O SYSTEMS 9

Memory Hierarchy - memory technologies – cache memory – measuring and improving cache performance – virtual memory, TLB's – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits - USB.

TOTAL : 45 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

Understand the basics structure of computers, operations and instructions.

Design arithmetic and logic unit.

Understand pipelined execution and design control unit.

Understand parallel processing architectures.

Understand the various memory systems and I/O communication.

TEXT BOOKS:

David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.

Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

REFERENCES:

William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.

John P. Hayes, Computer Architecture and Organization, Third Edition, Tata

McGraw Hill, 2012.
John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approachll**, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.**

CS8492 DATABASE MANAGEMENT SYSTEMS LTPC
3 003

OBJECTIVES

To learn the fundamentals of data models and to represent a database system using ER diagrams.

To study SQL and relational database design.

To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.

To understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures.

To have an introductory knowledge about the Storage and Query processing Techniques

UNIT I RELATIONAL DATABASES 10

Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL

UNIT II DATABASE DESIGN 8

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT III TRANSACTIONS 9 Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control –

Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery - Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.

UNIT IV IMPLEMENTATION TECHNIQUES 9

RAID – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation.

UNIT V ADVANCED TOPICS 9

Distributed Databases: Architecture, Data Storage, Transaction Processing – Object-based Databases: Object Database Concepts, Object-Relational features, ODMG Object Model, ODL, OQL - XML Databases: XML Hierarchical Model, DTD, XML Schema, XQuery – Information Retrieval: IR Concepts, Retrieval Models, Queries in IR systems.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Classify the modern and futuristic database applications based on size and complexity Map ER model to Relational model to perform database design effectively

Write queries using normalization criteria and optimize queries

Compare and contrast various indexing strategies in different database systems Appraise how advanced databases differ from traditional databases.

TEXT BOOKS:

Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2011.

2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson Education, 2011.

REFERENCES:

1. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.

Raghu Ramakrishnan, —Database Management Systemsll, Fourth Edition,

McGraw-Hill College Publications, 2015.

G.K.Gupta,"Database Management Systems”, Tata McGraw Hill, 2011.

CS8451 DESIGN AND ANALYSIS OF ALGORITHMS LTPC

3003

OBJECTIVES:

To understand and apply the algorithm analysis techniques.

To critically analyze the efficiency of alternative algorithmic solutions for the same problem

To understand different algorithm design techniques.

To understand the limitations of Algorithmic power.

UNIT I INTRODUCTION 9

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties. Analysis Framework – Empirical analysis - Mathematical analysis for Recursive and Non-recursive algorithms - Visualization

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER 9

Brute Force – Computing a^n – String Matching - Closest-Pair and Convex-Hull Problems - Exhaustive Search - Travelling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology – Binary Search – Merge sort – Quick sort – Heap Sort - Multiplication of Large Integers – Closest-Pair and Convex - Hull Problems.

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE 9

Dynamic programming **–** Principle of optimality **-** Coin changing problem**,** Computing a Binomial Coefficient – Floyd’s algorithm – Multi stage graph - Optimal Binary Search Trees – Knapsack Problem and Memory functions.

Greedy Technique – Container loading problem - Prim’s algorithm and Kruskal's Algorithm – 0/1 Knapsack problem, Optimal Merge pattern - Huffman Trees.

UNIT IV ITERATIVE IMPROVEMENT 9

The Simplex Method - The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs, Stable marriage Problem.

UNIT V COPING WITH THE LIMITATIONS OF ALGORITHM POWER 9

Lower - Bound Arguments - P, NP NP- Complete and NP Hard Problems. Backtracking – n-Queen problem - Hamiltonian Circuit Problem – Subset Sum Problem. Branch and Bound – LIFO Search and FIFO search - Assignment problem – Knapsack Problem – Travelling Salesman Problem - Approximation Algorithms for NP-Hard Problems – Travelling Salesman problem – Knapsack problem.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Design algorithms for various computing problems.

Analyze the time and space complexity of algorithms.

Critically analyze the different algorithm design techniques for a given problem.

Modify existing algorithms to improve efficiency.

TEXT BOOKS:

Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2012.

Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007.

REFERENCES:

Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.

Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, Reprint 2006.

Harsh Bhasin, “Algorithms Design and Analysis”, Oxford university press, 2016.

S. Sridhar, “Design and Analysis of Algorithms”, Oxford university press, 2014.

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CS8493 OPERATING SYSTEMS LTPC

3 003

OBJECTIVES:

To understand the basic concepts and functions of operating systems. To understand Processes and Threads

To analyze Scheduling algorithms.

To understand the concept of Deadlocks.

To analyze various memory management schemes.

To understand I/O management and File systems.

To be familiar with the basics of Linux system and Mobile OS like iOS and Android.

UNIT I OPERATING SYSTEM OVERVIEW 7

Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

UNIT II PROCESS MANAGEMENT 11

Processes - Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; CPU Scheduling - Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT III STORAGE MANAGEMENT 9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background,

Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

UNIT IV FILE SYSTEMS AND I/O SYSTEMS 9

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface - File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem, Streams, Performance.

UNIT V CASE STUDY 9

Linux System - Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS - iOS and Android - Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Analyze various scheduling algorithms.

Understand deadlock, prevention and avoidance algorithms.

Compare and contrast various memory management schemes. Understand the functionality of file systems.

Perform administrative tasks on Linux Servers.

Compare iOS and Android Operating Systems.

TEXT BOOK :

Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley and Sons Inc., 2012.

REFERENCES :

Ramaz Elmasri, A. Gil Carrick, David Levine, “Operating Systems – A Spiral Approach”, Tata McGraw Hill Edition, 2010.

Achyut S.Godbole, Atul Kahate, “Operating Systems”, McGraw Hill Education, 2016.

Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Pearson Education, 2004.

Gary Nutt, “Operating Systems”, Third Edition, Pearson Education, 2004.

Harvey M. Deitel, “Operating Systems”, Third Edition, Pearson Education, 2004.

Daniel P Bovet and Marco Cesati, “Understanding the Linux kernel”, 3rd edition, O’Reilly, 2005.

Neil Smyth, “iPhone iOS 4 Development Essentials – Xcode”, Fourth Edition, Payload media, 2011.

CS8494	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the phases in a software project

To understand fundamental concepts of requirements engineering and Analysis Modeling.

To understand the various software design methodologies

To learn various testing and maintenance measures

UNIT I SOFTWARE PROCESS AND AGILE DEVELOPMENT 9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process.

UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION 9

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

UNIT III SOFTWARE DESIGN 9

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design - Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

UNIT IV TESTING AND MAINTENANCE 9

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging –Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.

UNIT V PROJECT MANAGEMENT 9

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection - Risk Management-Risk Identification-RMMM Plan-CASE TOOLS

TOTAL :45 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

Identify the key activities in managing a software project. Compare different process models.

Concepts of requirements engineering and Analysis Modeling.

Apply systematic procedure for software design and deployment. Compare and contrast the various testing and maintenance.

Manage project schedule, estimate project cost and effort required.

TEXT BOOKS:

Roger S. Pressman, “Software Engineering – A Practitioner**‟s Approach”, Seventh Edition, Mc** Graw-Hill International Edition, 2010.

Ian Sommerville, “Software Engineering”, 9th Edition, Pearson Education Asia, 2011.

REFERENCES:

Rajib Mall, “Fundamentals of Software Engineering”, Third Edition, PHI Learning PrivateLimited, 2009.

Pankaj Jalote, “Software Engineering, A Precise Approach”, Wiley India, 2010.

Kelkar S.A., “Software Engineering”, Prentice Hall of India Pvt Ltd, 2007.

Stephen R.Schach, “Software Engineering”, Tata McGraw-Hill Publishing Company Limited,2007.

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CS8481 DATABASE MANAGEMENT SYSTEMS LABORATORY LTPC

0 042

AIM:

The aim of this laboratory is to inculcate the abilities of applying the principles of the database management systems. This course aims to prepare the students for projects where a proper implementation of databases will be required.

OBJECTIVES:

To understand data definitions and data manipulation commands To learn the use of nested and join queries

To understand functions, procedures and procedural extensions of data bases To be familiar with the use of a front end tool

To understand design and implementation of typical database applications

Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
Database Querying – Simple queries, Nested queries, Sub queries and Joins
Views, Sequences, Synonyms
Database Programming: Implicit and Explicit Cursors
Procedures and Functions
Triggers
Exception Handling
Database Design using ER modeling, normalization and Implementation for any application
Database Connectivity with Front End Tools
Case Study using real life database applications

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Use typical data definitions and manipulation commands.

Design applications to test Nested and Join Queries

Implement simple applications that use Views

Implement applications that require a Front-end Tool

Critically analyze the use of Tables, Views, Functions and Procedures

CS8461 OPERATING SYSTEMS LABORATORY LTPC
0 042

OBJECTIVES

To learn Unix commands and shell programming

To implement various CPU Scheduling Algorithms

To implement Process Creation and Inter Process Communication.

To implement Deadlock Avoidance and Deadlock Detection Algorithms

To implement Page Replacement Algorithms

To implement File Organization and File Allocation Strategies

LIST OF EXPERIMENTS

Basics of UNIX commands
Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir
Write C programs to simulate UNIX commands like cp, ls, grep, etc.
Shell Programming
Write C programs to implement the various CPU Scheduling Algorithms
Implementation of Semaphores
Implementation of Shared memory and IPC
Bankers Algorithm for Deadlock Avoidance
Implementation of Deadlock Detection Algorithm
Write C program to implement Threading & Synchronization Applications
Implementation of the following Memory Allocation Methods for fixed partition
a) First Fit b) Worst Fit c) Best Fit
Implementation of Paging Technique of Memory Management
Implementation of the following Page Replacement Algorithms
a) FIFO b) LRU c) LFU

Implementation of the various File Organization Techniques
Implementation of the following File Allocation Strategies
a) Sequential b) Indexed c) Linked

TOTAL: 60 PERIODS

OUTCOMES:
At the end of the course, the student should be able to
Compare the performance of various CPU Scheduling Algorithms
Implement Deadlock avoidance and Detection Algorithms
Implement Semaphores
Create processes and implement IPC
Analyze the performance of the various Page Replacement
Algorithms Implement File Organization and File Allocation Strategies

		L	T	P	C
HS8461	**ADVANCED READING AND WRITING**	**0**	**0**	**2**	**1**

OBJECTIVES:

Strengthen the reading skills of students of engineering.
Enhance their writing skills with specific reference to technical writing.
Develop students' critical thinking skills.
Provide more opportunities to develop their project and proposal writing skills.

UNIT I

Reading - Strategies for effective reading-Use glosses and footnotes to aid reading comprehension- Read and recognize different text types-Predicting content using photos and title **Writing**-Plan before writing- Develop a paragraph: topic sentence, supporting sentences, concluding sentence –Write a descriptive paragraph

UNIT II

Reading-Read for details-Use of graphic organizers to review and aid comprehension **Writing**-State reasons and examples to support ideas in writing- Write a paragraph with reasons and examples- Write an opinion paragraph

UNIT III

Reading- Understanding pronoun reference and use of connectors in a passage- speed reading techniques-**Writing-** Elements of a good essay-Types of essays- descriptive-narrative- issue-based-argumentative-analytical.

UNIT IV

Reading- Genre and Organization of Ideas- **Writing-** Email writing- visumes – Job application-project writing-writing convincing proposals.

UNIT V

Reading- Critical reading and thinking- understanding how the text positions the reader- identify
Writing- Statement of Purpose- letter of recommendation- Vision statement

TOTAL: 30 PERIODS

OUTCOMES:
At the end of the course Learners will be able to:
Write different types of essays.
Write winning job applications.

Read and evaluate texts critically.
Display critical thinking in various professional contexts.

TEXT BOOKS:

Gramer F. Margot and Colin S. Ward **Reading and Writing (Level 3)** Oxford University Press: Oxford, 2011

Debra Daise, CharlNorloff, and Paul Carne **Reading and Writing (Level 4)** Oxford University Press: Oxford, 2011

REFERENCES:

Davis, Jason and Rhonda LIss.**Effective Academic Writing (Level 3)** Oxford University Press: Oxford, 2006

E. Suresh Kumar and et al. **Enriching Speaking and Writing Skills.** Second Edition. Orient Black swan: Hyderabad, 2012

Withrow, Jeans and et al**. Inspired to Write. Readings and Tasks to develop writing skills.** Cambridge University Press: Cambridge, 2004

Goatly, Andrew**. Critical Reading and Writing.** Routledge: United States of America, 2000

Petelin, Roslyn and Marsh Durham**. The Professional Writing Guide: Knowing Well and Knowing Why.** Business & Professional Publishing: Australia, 2004

MA8551 ALGEBRA AND NUMBER THEORY L T P C
4 0 0 4

OBJECTIVES:

To introduce the basic notions of groups, rings, fields which will then be used to solve related problems.

To introduce and apply the concepts of rings, finite fields and polynomials. To understand the basic concepts in number theory

To examine the key questions in the Theory of Numbers.

To give an integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

UNIT I GROUPS AND RINGS 12

Groups : Definition - Properties - Homomorphism - Isomorphism - Cyclic groups - Cosets - Lagrange's theorem. Rings: Definition - Sub rings - Integral domain - Field - Integer modulo n - Ring homomorphism.

UNIT II FINITE FIELDS AND POLYNOMIALS 12

Rings - Polynomial rings - Irreducible polynomials over finite fields - Factorization of polynomials over finite fields.

UNIT III DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS 12

Division algorithm – Base - b representations – Number patterns – Prime and composite numbers – GCD – Euclidean algorithm – Fundamental theorem of arithmetic – LCM.

UNIT IV DIOPHANTINE EQUATIONS AND CONGRUENCES 12

Linear Diophantine equations – Congruence's – Linear Congruence's - Applications: Divisibility tests - Modular exponentiation-Chinese remainder theorem – 2 x 2 linear systems.

UNIT V CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS 12

Wilson's theorem – Fermat's little theorem – Euler's theorem – Euler's Phi functions – Tau and Sigma functions.

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students should be able to:

Apply the basic notions of groups, rings, fields which will then be used to solve related problems.

Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.

Demonstrate accurate and efficient use of advanced algebraic techniques.

Demonstrate their mastery by solving non - trivial problems related to the concepts, and by proving simple theorems about the, statements proven by the text.

Apply integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

TEXTBOOKS:

Grimaldi, R.P and Ramana, B.V., "Discrete and Combinatorial Mathematics", Pearson Education, 5th Edition, New Delhi, 2007.

2. Koshy, T., "Elementary Number Theory with Applications", Elsevier Publications, New Delhi, 2002.

REFERENCES:

Lidl, R. and Pitz, G, "Applied Abstract Algebra", Springer Verlag, New Delhi, 2nd Edition, 2006.

Niven, I., Zuckerman.H.S., and Montgomery, H.L., "An Introduction to Theory of Numbers", John Wiley and Sons , Singapore, 2004.

San Ling and Chaoping Xing, "Coding Theory – A first Course", Cambridge Publications, Cambridge, 2004.

CS8591	**COMPUTER NETWORKS**	**L**	**TP**		**C**
		3	**0**	**0**	**3**

OBJECTIVES:

To understand the protocol layering and physical level communication.

To analyze the performance of a network.

To understand the various components required to build different networks.

To learn the functions of network layer and the various routing protocols.

To familiarize the functions and protocols of the Transport layer.

UNIT I INTRODUCTION AND PHYSICAL LAYER 9

Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Transmission media – Switching – Circuit-switched Networks – Packet Switching.

UNIT II DATA-LINK LAYER & MEDIA ACCESS 9

Introduction – Link-Layer Addressing – DLC Services – Data-Link Layer Protocols – HDLC – PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs – Introduction – IEEE 802.11, Bluetooth – Connecting Devices.

UNIT III NETWORK LAYER 9

Network Layer Services – Packet switching – Performance – IPV4 Addresses – Forwarding of IP Packets - Network Layer Protocols: IP, ICMP v4 – Unicast Routing Algorithms – Protocols – Multicasting Basics – IPV6 Addressing – IPV6 Protocol.

UNIT IV TRANSPORT LAYER 9

Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol – Transmission Control Protocol – SCTP.

UNIT V APPLICATION LAYER 9

and HTTP – FTP – Email –Telnet –SSH – DNS – SNMP. 60

TOTAL : 45 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

Understand the basic layers and its functions in computer networks.
Evaluate the performance of a network.

Understand the basics of how data flows from one node to another. Analyze and design routing algorithms.

Design protocols for various functions in the network.

Understand the working of various application layer protocols.

TEXT BOOK:

Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.

REFERENCES

Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.

William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.

Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.

Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011.

James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

EC8691 MICROPROCESSORS AND MICROCONTROLLERS LTPC
3 003

OBJECTIVES:

To understand the Architecture of 8086 microprocessor.

To learn the design aspects of I/O and Memory Interfacing circuits. To interface microprocessors with supporting chips.

To study the Architecture of 8051 microcontroller.

To design a microcontroller based system

UNIT I THE 8086 MICROPROCESSOR 9

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

UNIT II 8086 SYSTEM BUS STRUCTURE 9

8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors.

UNIT III I/O INTERFACING 9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

UNIT IV MICROCONTROLLER 9

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT V INTERFACING MICROCONTROLLER 9

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Understand and execute programs based on 8086 microprocessor.
Design Memory Interfacing circuits.
Design and interface I/O circuits.
Design and implement 8051 microcontroller based systems.

TEXT BOOKS:

1. Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2007. (UNIT I-III)

   Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011. (UNIT IV-V)

REFERENCES:

Doughlas V.Hall, "Microprocessors and Interfacing, Programming and Hardware",TMH,2012

A.K.Ray,K.M.Bhurchandi,"Advanced Microprocessors and Peripherals "3rd edition, Tata McGrawHill,2012

CS8501 THEORY OF COMPUTATION LTPC
3 0 0 3

OBJECTIVES:

To understand the language hierarchy
To construct automata for any given pattern and find its equivalent regular expressions
To design a context free grammar for any given language
To understand Turing machines and their capability
To understand undecidable problems and NP class problems

UNIT I AUTOMATA FUNDAMENTALS 9

Introduction to formal proof – Additional forms of Proof – Inductive Proofs –Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – Finite Automata with Epsilon Transitions

UNIT II REGULAR EXPRESSIONS AND LANGUAGES 9

Regular Expressions – FA and Regular Expressions – Proving Languages not to be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata**.**

UNIT III CONTEXT FREE GRAMMAR AND LANGUAGES 9

CFG – Parse Trees – Ambiguity in Grammars and Languages – Definition of the Pushdown Automata – Languages of a Pushdown Automata – Equivalence of Pushdown Automata and CFG, Deterministic Pushdown Automata.

UNIT IV PROPERTIES OF CONTEXT FREE LANGUAGES 9

Normal Forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

UNIT V UNDECIDABILITY 9

Non Recursive Enumerable (RE) Language – Undecidable Problem with RE – Undecidable Problems about TM – Post's Correspondence Problem, The Class P and NP.

TOTAL :45PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Construct automata, regular expression for any pattern. Write Context free grammar for any construct.

Design Turing machines for any language.

Propose computation solutions using Turing machines.

Derive whether a problem is decidable or not.

TEXT BOOK:

1**.** J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003.

REFERENCES:

H.R.Lewis and C.H.Papadimitriou, "Elements of the theory of Computation", Second Edition, PHI, 2003.

J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, TMH, 2003.

Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

CS8592 OBJECT ORIENTED ANALYSIS AND DESIGN LTPC
3 0 0 3

OBJECTIVES:

To understand the fundamentals of object modeling

To understand and differentiate Unified Process from other approaches. To design with static UML diagrams.

To design with the UML dynamic and implementation diagrams.

To improve the software design with design patterns.

To test the software against its requirements specification

UNIT I UNIFIED PROCESS AND USE CASE DIAGRAMS 9

Introduction to OOAD with OO Basics - Unified Process – UML diagrams – Use Case –Case study – the Next Gen POS system, Inception -Use case Modelling – Relating Use cases – include, extend and generalization – When to use Use-cases

UNIT II STATIC UML DIAGRAMS 9

Class Diagram— Elaboration – Domain Model – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition - Relationship between sequence diagrams and use cases – When to use Class Diagrams

UNIT III DYNAMIC AND IMPLEMENTATION UML DIAGRAMS 9

Dynamic Diagrams – UML interaction diagrams - System sequence diagram – Collaboration diagram – When to use Communication Diagrams - State machine diagram and Modelling –When to use State Diagrams - Activity diagram – When to use activity diagrams

Implementation Diagrams - UML package diagram - When to use package diagrams - Component and Deployment Diagrams – When to use Component and Deployment diagrams

UNIT IV DESIGN PATTERNS **9**

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller

Design Patterns – creational – factory method – **structural** – Bridge – Adapter – **behavioural** – Strategy – observer –Applying GoF design patterns – Mapping design to code

UNIT V TESTING **9**

Object Oriented Methodologies – Software Quality Assurance – Impact of object orientation on Testing – Develop Test Cases and Test Plans

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students will be able to:

Express software design with UML diagrams

Design software applications using OO concepts.

Identify various scenarios based on software requirements

Transform UML based software design into pattern based design using design patterns

Understand the various testing methodologies for OO software

TEXT BOOKS:

Craig Larman, “Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development”, Third Edition, Pearson Education, 2005.

Ali Bahrami - Object Oriented Systems Development - McGraw Hill International Edition - 1999

REFERENCES:

Erich Gamma, a n d Richard Helm, Ralph Johnson, John Vlissides, “Design patterns: Elements of Reusable Object-Oriented Software”, Addison-Wesley, 1995.

Martin Fowler, “UML Distilled: A Brief Guide to the Standard Object Modeling Language”, Third edition, Addison Wesley, 2003.

EC8681 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY **LT PC 0042**

OBJECTIVES:

To Introduce ALP concepts, features and Coding methods

Write ALP for arithmetic and logical operations in 8086 and 8051 Differentiate Serial and Parallel Interface

Interface different I/Os with Microprocessors Be familiar with MASM

LIST OF EXPERIMENTS:

8086 Programs using kits and MASM

Basic arithmetic and Logical operations

Move a data block without overlap

Code conversion, decimal arithmetic and Matrix operations.

Floating point operations, string manipulations, sorting and searching

Password checking, Print RAM size and system date

Counters and Time Delay

Peripherals and Interfacing Experiments

Traffic light controller

Stepper motor control

Digital clock
Key board and Display
Printer status
Serial interface and Parallel interface
A/D and D/A interface and Waveform Generation

8051 Experiments using kits and MASM

Basic arithmetic and Logical operations
Square and Cube program, Find 2's complement of a number
Unpacked BCD to ASCII

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Write ALP Programmes for fixed and Floating Point and Arithmetic operations Interface different I/Os with processor

Generate waveforms using
Microprocessors Execute Programs in 8051

Explain the difference between simulator and Emulator

LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE:

8086 development kits - 30 nos
Interfacing Units - Each 10 nos
Microcontroller - 30 nos

SOFTWARE:

Intel Desktop Systems with MASM - 30 nos
8086 Assembler
8051 Cross Assembler

CS8582 OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY L T P C
0 0 4 2

OBJECTIVES:

To capture the requirements specification for an intended software system
To draw the UML diagrams for the given specification

To map the design properly to code
To test the software system thoroughly for all scenarios
To improve the design by applying appropriate design patterns.

Draw standard UML diagrams using an UML modeling tool for a given case study and map design to code and implement a 3 layered architecture. Test the developed code and validate whether the SRS is satisfied.

Identify a software system that needs to be developed.
Document the Software Requirements Specification (SRS) for the identified system.
Identify use cases and develop the Use Case model.
Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.

Using the identified scenarios, find the interaction between objects and represent them using
UML Sequence and Collaboration Diagrams

Draw relevant State Chart and Activity Diagrams for the same system.
Implement the system as per the detailed design
Test the software system for all the scenarios identified as per the usecase diagram
Improve the reusability and maintainability of the software system by applying appropriate

design patterns.
10. Implement the modified system and test it for various scenarios

SUGGESTED DOMAINS FOR MINI-PROJECT:

Passport automation system.
Book bank
Exam registration
Stock maintenance system.
Online course reservation system
Airline/Railway reservation system
Software personnel management system
Credit card processing
e-book management system
Recruitment system
Foreign trading system
Conference management system
BPO management system
Library management system
Student information system

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to:

Perform OO analysis and design for a given problem specification.
Identify and map basic software requirements in UML mapping.
Improve the software quality using design patterns and to explain the rationale behind applying specific design patterns
Test the compliance of the software with the SRS.

HARDWARE REQUIREMENTS

Standard PC

SOFTWARE REQUIREMENTS

Windows 7 or higher
ArgoUML that supports UML 1.4 and higher
Selenium, JUnit or Apache JMeter

CS8581 NETWORKS LABORATORY L T P C 0042

OBJECTIVES:

To learn and use network commands.
To learn socket programming.
To implement and analyze various network protocols. To learn and use simulation tools.
To use simulation tools to analyze the performance of various network protocols.

LIST OF EXPERIMENTS

Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and traceroute PDUs using a network protocol analyzer and examine.
Write a HTTP web client program to download a web page using TCP sockets.
Applications using TCP sockets like:
Echo client and echo server
Chat
File Transfer

Simulation of DNS using UDP sockets.
Write a code simulating ARP /RARP protocols.
Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
Study of TCP/UDP performance using Simulation tool.
Simulation of Distance Vector/ Link State Routing algorithm.
Performance evaluation of Routing protocols using Simulation tool.
Simulation of error correction code (like CRC).

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

Implement various protocols using TCP and UDP.
Compare the performance of different transport layer protocols.
Use simulation tools to analyze the performance of various network protocols.
Analyze various routing algorithms.
Implement error correction codes.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS:

HARDWARE:

1. Standalone desktops 30 Nos

SOFTWARE:

1. C / C++ / Java / Python / Equivalent Compiler 30
2. Network simulator like NS2/Glomosim/OPNET/ Packet Tracer / Equivalent

CS8651	INTERNET PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand different Internet Technologies.
To learn java-specific web services architecture

UNIT I WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0 9

Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet protocols – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations.

UNIT II CLIENT SIDE PROGRAMMING 9

Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling-DHTML with JavaScript- JSON introduction – Syntax – Function Files – Http Request – SQL.

UNIT III SERVER SIDE PROGRAMMING 9

Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions-Session Handling- Understanding Cookies- Installing and Configuring Apache Tomcat Web Server- DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - JSP: Understanding Java Server Pages-JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code.

UNIT IV PHP and XML **9**

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions- Form Validation- Regular Expressions - File handling – Cookies - Connecting to Database. XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

UNIT V INTRODUCTION TO AJAX and WEB SERVICES **9**

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP.

TOTAL 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Construct a basic website using HTML and Cascading Style Sheets.

Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.

Develop server side programs using Servlets and JSP.

Construct simple web pages in PHP and to represent data in XML format.

Use AJAX and web services to develop interactive web applications

TEXT BOOK:

Deitel and Deitel and Nieto, “Internet and World Wide Web - How to Program”, Prentice Hall, 5th Edition, 2011.

REFERENCES:

Stephen Wynkoop and John Burke “Running a Perfect Website”, QUE, 2nd Edition,1999.

Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.

Jeffrey C and Jackson, “Web Technologies A Computer Science Perspective”, Pearson Education, 2011.

Gopalan N.P. and Akilandeswari J., “Web Technology”, Prentice Hall of India, 2011.

UttamK.Roy, “Web Technologies”, Oxford University Press, 2011.

CS8691 ARTIFICIAL INTELLIGENCE **L T P C**
3 0 0 3

OBJECTIVES:

To understand the various characteristics of Intelligent agents To learn the different search strategies in AI

To learn to represent knowledge in solving AI problems

To understand the different ways of designing software agents To know about the various applications of AI.

UNIT I INTRODUCTION **9**

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

UNIT II PROBLEM SOLVING METHODS **9**

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search - Game Playing - Optimal Decisions in Games – Alpha - Beta Pruning - Stochastic Games

UNIT III KNOWLEDGE REPRESENTATION **9**

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering-Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information

UNIT IV SOFTWARE AGENTS **9**

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

UNIT V APPLICATIONS **9**

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Use appropriate search algorithms for any AI problem

Represent a problem using first order and predicate logic

Provide the apt agent strategy to solve a given problem

Design software agents to solve a problem

Design applications for NLP that use Artificial Intelligence.

TEXT BOOKS:

S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third

I. Bratko, "Prolog: Programming for Artificial Intelligence", Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

REFERENCES:

M. Tim Jones, "Artificial Intelligence: A Systems Approach(Computer Science)", Jones and Bartlett Publishers, Inc.; First Edition, 2008

Nils J. Nilsson, "The Quest for Artificial Intelligence", Cambridge University Press, 2009.

William F. Clocksin and Christopher S. Mellish," Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003.

Gerhard Weiss, "Multi Agent Systems", Second Edition, MIT Press, 2013.

David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, 2010.

CS8601	MOBILE COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the basic concepts of mobile computing.
To learn the basics of mobile telecommunication system .
To be familiar with the network layer protocols and Ad-Hoc networks. To know the basis of transport and application layer protocols.
To gain knowledge about different mobile platforms and application development.

UNIT I INTRODUCTION 9

Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies- Multiplexing – Spread spectrum -MAC Protocols – SDMA- TDMA- FDMA- CDMA

UNIT II MOBILE TELECOMMUNICATION SYSTEM 9

Introduction to Cellular Systems - GSM – Services & Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS-UMTS – Architecture – Handover - Security

UNIT III MOBILE NETWORK LAYER 9

Mobile IP – DHCP – AdHoc– Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV , Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks (VANET) –MANET Vs VANET – Security.

UNIT IV MOBILE TRANSPORT AND APPLICATION LAYER 9

Mobile TCP– WAP – Architecture – WDP – WTLS – WTP –WSP – WAE – WTA Architecture – WML

UNIT V MOBILE PLATFORMS AND APPLICATIONS 9

Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues

TOTAL 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Explain the basics of mobile telecommunication systems
Illustrate the generations of telecommunication systems in wireless networks
Determine the functionality of MAC, network layer and Identify a routing protocol for a given Ad hoc network
Explain the functionality of Transport and Application layers
Develop a mobile application using android/blackberry/ios/Windows SDK

TEXT BOOKS:

Jochen Schiller, “Mobile Communications”, PHI, Second Edition, 2003.
Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt.Ltd, New Delhi – 2012

REFERENCES

Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems",Thomson Asia Pvt Ltd, 2005.
Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
William.C.Y.Lee,“Mobile Cellular Telecommunications-Analog and Digital Systems”, Second Edition,TataMcGraw Hill Edition ,2006.
C.K.Toh, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.

Android Developers : http://developer.android.com/index.html
Apple Developer : https://developer.apple.com/
Windows Phone DevCenter : http://developer.windowsphone.com
BlackBerry Developer : http://developer.blackberry.com

CS8602	COMPILER DESIGN	L	T	P	C
		3	0	2	4

OBJECTIVES:

To learn the various phases of compiler.
To learn the various parsing techniques.
To understand intermediate code generation and run-time environment.
To learn to implement front-end of the compiler.
To learn to implement code generator.

UNIT I INTRODUCTION TO COMPILERS 9

Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimizing DFA.

UNIT II SYNTAX ANALYSIS 12

Role of Parser – Grammars – Error Handling – Context-free grammars – Writing a grammar – Top Down Parsing - General Strategies Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0)Item Construction of SLR Parsing Table - Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC.

UNIT III INTERMEDIATE CODE GENERATION 8

Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking.

UNIT IV RUN-TIME ENVIRONMENT AND CODE GENERATION 8

Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management - Issues in Code Generation - Design of a simple Code Generator.

UNIT V CODE OPTIMIZATION 8

Principal Sources of Optimization – Peep-hole optimization - DAG- Optimization of Basic Blocks- Global Data Flow Analysis - Efficient Data Flow Algorithm.

LIST OF EXPERIMENTS:

Develop a lexical analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.). Create a symbol table, while recognizing identifiers.
Implement a Lexical Analyzer using Lex Tool
Implement an Arithmetic Calculator using LEX and YACC
Generate three address code for a simple program using LEX and YACC.
Implement simple code optimization techniques (Constant folding, Strength reduction and Algebraic transformation)
Implement back-end of the compiler for which the three address code is given as input and the 8086 assembly language code is produced as output.

PRACTICALS 30 PERIODS
THEORY 45 PERIODS
TOTAL : 75 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

Understand the different phases of compiler.
Design a lexical analyzer for a sample language.

Apply different parsing algorithms to develop the parsers for a given grammar.
Understand syntax-directed translation and run-time environment.

Learn to implement code optimization techniques and a simple code generator.
Design and implement a scanner and a parser using LEX and YACC tools.

TEXT BOOK:

Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques and Tools**ll, Second Edition, Pearson Education, 2009.**

REFERENCES

Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan Kaufmann Publishers, 2002.

Steven S. Muchnick, Advanced Compiler Design and Implementation**ll, Morgan Kaufmann** Publishers - Elsevier Science, India, Indian Reprint 2003.

Keith D Cooper and Linda Torczon, Engineering a Compiler**ll, Morgan Kaufmann** Publishers Elsevier Science, 2004.

V. Raghavan, Principles of Compiler Design**ll, Tata McGraw Hill Education Publishers,** 2010.

Allen I. Holub, Compiler Design in C**ll, Prentice**-Hall Software Series, 1993.

CS8603 DISTRIBUTED SYSTEMS LT PC 3003

OBJECTIVES:

To understand the foundations of distributed systems.

To learn issues related to clock Synchronization and the need for global state in distributed systems.

To learn distributed mutual exclusion and deadlock detection algorithms.

To understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems.

To learn the characteristics of peer-to-peer and distributed shared memory systems.

UNIT I INTRODUCTION 9

Introduction: Definition –Relation to computer system components –Motivation –Relation to parallel systems – Message-passing systems versus shared memory systems –Primitives for distributed communication –Synchronous versus asynchronous executions –Design issues and challenges. **A model of distributed computations:** A distributed program –A model of distributed executions –Models of communication networks –Global state – Cuts –Past and future cones of an event –Models of process communications. **Logical Time**: A framework for a system of logical clocks –Scalar time –Vector time – Physical clock synchronization: NTP.

UNIT II MESSAGE ORDERING & SNAPSHOTS 9

Message ordering and group communication: Message ordering paradigms –Asynchronous execution with synchronous communication –Synchronous program order on an asynchronous system –Group communication – Causal order (CO) - Total order. **Global state and snapshot recording algorithms:** Introduction –System model and definitions –Snapshot algorithms for FIFO channels

UNIT III DISTRIBUTED MUTEX & DEADLOCK 9

Distributed mutual exclusion algorithms: Introduction – Preliminaries – Lamport's algorithm – Ricart-Agrawala algorithm – Maekawa's algorithm – Suzuki–Kasami's broadcast algorithm. **Deadlock detection in distributed systems:** Introduction – System model – Preliminaries – Models of deadlocks – Knapp's classification – Algorithms for the single resource model, the AND model and the OR model.

UNIT IV RECOVERY & CONSENSUS 9

Checkpointing and rollback recovery: Introduction – Background and definitions – Issues in failure recovery – Checkpoint-based recovery – Log-based rollback recovery – Coordinated checkpointing algorithm – Algorithm for asynchronous checkpointing and recovery. **Consensus and agreement algorithms:** Problem definition – Overview of results – Agreement in a failure – free system – Agreement in synchronous systems with failures.

UNIT V P2P & DISTRIBUTED SHARED MEMORY 9

Peer-to-peer computing and overlay graphs: Introduction – Data indexing and overlays – Chord – Content addressable networks – Tapestry. **Distributed shared memory:** Abstraction and advantages – Memory consistency models –Shared memory Mutual Exclusion.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of this course, the students will be able to:

Elucidate the foundations and issues of distributed systems

Understand the various synchronization issues and global state for distributed systems.

Understand the Mutual Exclusion and Deadlock detection algorithms in distributed systems Describe the agreement protocols and fault tolerance mechanisms in distributed systems. Describe the features of peer-to-peer and distributed shared memory systems

TEXT BOOKS:

Kshemkalyani, Ajay D., and Mukesh Singhal. Distributed computing: principles, algorithms, and systems. Cambridge University Press, 2011.

George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems Concepts and Design”, Fifth Edition, Pearson Education, 2012.

REFERENCES:

Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.

Mukesh Singhal and Niranjan G. Shivaratri. Advanced concepts in operating systems. McGraw-Hill, Inc., 1994.

Tanenbaum A.S., Van Steen M., “Distributed Systems: Principles and Paradigms”, Pearson Education, 2007.

Liu M.L., “Distributed Computing, Principles and Applications”, Pearson Education, 2004.

Nancy A Lynch, “Distributed Algorithms”, Morgan Kaufman Publishers, USA, 2003.

CS8661 INTERNET PROGRAMMING LABORATORY L T P C 0042

OBJECTIVES:

To be familiar with Web page design using HTML/XML and style sheets

To be exposed to creation of user interfaces using Java frames and applets.

To learn to create dynamic web pages using server side scripting.

To learn to write Client Server applications.

To be familiar with the PHP programming.

To be exposed to creating applications with AJAX

LIST OF EXPERIMENTS

Create a web page with the following using HTML

To embed a map in a web page

To fix the hot spots in that map

Show all the related information when the hot spots are clicked.

Create a web page with the following.

Cascading style sheets.

Embedded style sheets.

Inline style sheets. Use our college information for the web pages.

Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.

Write programs in Java using Servlets:

i. To invoke servlets from HTML forms

Session tracking using hidden form fields and Session tracking for a hit count

Write programs in Java to create three-tier applications using servlets for conducting on-line examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.

Install TOMCAT web server. Convert the static web pages of programs into dynamic web pages using servlets (or JSP) and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

Redo the previous task using JSP by converting the static web pages into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database.

Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document

i. Validate the form using PHP regular expression.

PHP stores a form data into database.

Write a web service for finding what people think by asking 500 people's opinion for any consumer product.

TOTAL: 60PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

Construct Web pages using HTML/XML and style sheets.

Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.

Develop dynamic web pages using server side scripting.
Use PHP programming to develop web applications.

Construct web applications using AJAX and web services.

SOFTWARE REQUIRED:

Dream Weaver or Equivalent, MySQL or Equivalent, Apache Server, WAMP/XAMPP

CS8662 MOBILE APPLICATION DEVELOPMENT LABORATORY L T P C 0042

OBJECTIVES:

To understand the components and structure of mobile application development frameworks for Android and windows OS based mobiles.

To understand how to work with various mobile application development frameworks.

To learn the basic and important design concepts and issues of development of mobile applications.

To understand the capabilities and limitations of mobile devices.

LIST OF EXPERIMENTS

Develop an application that uses GUI components, Font and Colours
Develop an application that uses Layout Managers and event listeners.
Write an application that draws basic graphical primitives on the screen.
Develop an application that makes use of databases.
Develop an application that makes use of Notification Manager
Implement an application that uses Multi-threading
Develop a native application that uses GPS location information
Implement an application that writes data to the SD card.
Implement an application that creates an alert upon receiving a message
Write a mobile application that makes use of RSS feed
Develop a mobile application to send an email.
Develop a Mobile application for simple needs (Mini Project)

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

Develop mobile applications using GUI and Layouts.
Develop mobile applications using Event Listener.
Develop mobile applications using Databases.
Develop mobile applications using RSS Feed, Internal/External Storage, SMS, Multi-threading and GPS.
Analyze and discover own mobile app for simple needs.

REFERENCES:

1. Build Your Own Security Lab, Michael Gregg, Wiley India

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

Standalone desktops with Windows or Android or iOS or Equivalent Mobile Application Development Tools with appropriate emulators and debuggers - 30 Nos.

HS8581 PROFESSIONAL COMMUNICATION L T P C 0021

OBJECTIVES:

The course aims to:

Enhance the Employability and Career Skills of students Orient the students towards grooming as a professional Make them Employable Graduates
Develop their confidence and help them attend interviews successfully.

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes

TOTAL : 30 PERIODS

OUTCOMES:

At the end of the course Learners will be able to:

Make effective presentations
Participate confidently in Group Discussions.
Attend job interviews and be successful in them.
Develop adequate Soft Skills required for the workplace

Recommended Software

Open Source Software
Win English

REFERENCES:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015
E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.
Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014
S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

MG8591 PRINCIPLES OF MANAGEMENT LT PC 3003

OBJECTIVES:

To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization .

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority –

centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management

UNIT IV DIRECTING 9

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication –communication and IT.

UNIT V CONTROLLING 9

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXTBOOKS:

Stephen P. Robbins & Mary Coulter, “Management”, Prentice Hall (India) Pvt. Ltd., 10th Edition, 2009.

JAF Stoner, Freeman R.E and Daniel R Gilbert “Management”, Pearson Education, 6th Edition, 2004.

REFERENCES:

Stephen A. Robbins & David A. Decenzo & Mary Coulter, “Fundamentals of Management” Pearson Education, 7th Edition, 2011.

Robert Kreitner & Mamata Mohapatra, “ Management”, Biztantra, 2008.

Harold Koontz & Heinz Weihrich “Essentials of management” Tata McGraw Hill,1998.

Tripathy PC & Reddy PN, “Principles of Management”, Tata McGraw Hill, 1999

CS8792	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand Cryptography Theories, Algorithms and Systems.

To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

UNIT I INTRODUCTION 9

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

UNIT II SYMMETRIC KEY CRYPTOGRAPHY 9

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures - Modular arithmetic-Euclid**'s algorithm**- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS**:** SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 –

Key distribution.

UNIT III PUBLIC KEY CRYPTOGRAPHY 9

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT IV MESSAGE AUTHENTICATION AND INTEGRITY 9

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509

UNIT V SECURITY PRACTICE AND SYSTEM SECURITY 9

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

TOTAL 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Understand the fundamentals of networks security, security architecture, threats and vulnerabilities

Apply the different cryptographic operations of symmetric cryptographic algorithms Apply the different cryptographic operations of public key cryptography

Apply the various Authentication schemes to simulate different applications.

Understand various Security practices and System security standards

TEXT BOOK:

William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.

REFERENCES:

C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd

BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.

Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2

CS8791 CLOUD COMPUTING LT PC 3003

OBJECTIVES:

To understand the concept of cloud computing.

To appreciate the evolution of cloud from the existing technologies.

To have knowledge on the various issues in cloud computing.

To be familiar with the lead players in cloud.

To appreciate the emergence of cloud as the next generation computing paradigm.

UNIT I INTRODUCTION 9

Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.

UNIT II CLOUD ENABLING TECHNOLOGIES 10

Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish-Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery.

UNIT III CLOUD ARCHITECTURE, SERVICES AND STORAGE 8

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

UNIT IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD 10

Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.

UNIT V CLOUD TECHNOLOGIES AND ADVANCEMENTS 8

Hadoop – MapReduce – Virtual Box -- Google App Engine – Programming Environment for Google App Engine –– Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

TOTAL: 45 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

Articulate the main concepts, key technologies, strengths and limitations of cloud computing.

Learn the key and enabling technologies that help in the development of cloud.

Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.

Explain the core issues of cloud computing such as resource management and security. Be able to install and use current cloud technologies.

Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

TEXT BOOKS:

Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

Rittinghouse, John W., and James F. Ransome, “Cloud Computing: Implementation, Management and Security”, CRC Press, 2017.

REFERENCES:

Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, “Mastering Cloud Computing”, Tata Mcgraw Hill, 2013.

Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach”, Tata Mcgraw Hill, 2009.

George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice)”, O'Reilly, 2009.

CS8711 **CLOUD COMPUTING LABORATORY** **LTPC**
0 042

OBJECTIVES:

To develop web applications in cloud

To learn the design and development process involved in creating a cloud based application

To learn to implement and use parallel programming using Hadoop

Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.

Install a C compiler in the virtual machine created using virtual box and execute Simple Programs

Install Google App Engine. Create *hello world* app and other simple web applications using python/java.

Use GAE launcher to launch the web applications.

Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.

Find a procedure to transfer the files from one virtual machine to another virtual machine.

Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)

Install Hadoop single node cluster and run simple applications like wordcount.

TOTAL : 60 PERIODS

OUTCOMES:

On completion of this course, the students will be able to:

Configure various virtualization tools such as Virtual Box, VMware workstation. Design and deploy a web application in a PaaS environment.

Learn how to simulate a cloud environment to implement new schedulers.

Install and use a generic cloud environment that can be used as a private cloud.

Manipulate large data sets in a parallel environment.

IT8761 **SECURITY LABORATORY** **L T P C**
0 0 4 2

OBJECTIVES:

To learn different cipher techniques

To implement the algorithms DES, RSA,MD5,SHA-1

To use network security tools and vulnerability assessment tools

LIST OF EXPERIMENTS

Perform encryption, decryption using the following substitution techniques
Ceaser cipher, (ii) playfair cipher iii) Hill Cipher iv) Vigenere cipher

Perform encryption and decryption using following transposition techniques
i) Rail fence ii) row & Column Transformation

Apply DES algorithm for practical applications.

Apply AES algorithm for practical applications.

Implement RSA Algorithm using HTML and JavaScript

Implement the Diffie-Hellman Key Exchange algorithm for a given problem.

Calculate the message digest of a text using the SHA-1 algorithm.

Implement the SIGNATURE SCHEME - Digital Signature Standard.

Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w.

Automated Attack and Penetration Tools

Defeating Malware

Building Trojans ii) Rootkit Hunter

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

Develop code for classical Encryption Techniques to solve the problems.

Build cryptosystems by applying symmetric and public key encryption algorithms. Construct code for authentication algorithms.

Develop a signature scheme using Digital signature standard.

Demonstrate the network security system using open source tools

REFERENCES:

1. Build Your Own Security Lab, Michael Gregg, Wiley India

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS: SOFTWARE: C / C++ / Java or equivalent compiler GnuPG, Snort, N-Stalker or Equivalent **HARDWARE:** Standalone desktops - 30 Nos. (or) Server supporting 30 terminals or more.

CS8811	**PROJECT WORK**	**L T P C**
		0 020 10

OBJECTIVES:

To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the

Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 300 PERIODS

OUTCOME:

On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

CS8075	**DATA WAREHOUSING AND DATA MINING**	**L T P C**
		3 0 0 3

OBJECTIVES:

To understand data warehouse concepts, architecture, business analysis and tools

To understand data pre-processing and data visualization techniques

To study algorithms for finding hidden and interesting patterns in data

To understand and apply various classification and clustering techniques using tools.

UNIT I DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING (OLAP) 9 Basic Concepts - Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors - Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

UNIT II DATA MINING – INTRODUCTION 9

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

UNIT III DATA MINING - FREQUENT PATTERN ANALYSIS 9

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns

UNIT IV CLASSIFICATION AND CLUSTERING 9

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines –– Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy.

Clustering Techniques – Cluster analysis-Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

UNIT V WEKA TOOL 9

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database - Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students should be able to:

Design a Data warehouse system and perform business analysis with OLAP tools.
Apply suitable pre-processing and visualization techniques for data analysis
Apply frequent pattern and association rule mining techniques for data analysis
Apply appropriate classification and clustering techniques for data analysis

TEXT BOOK:

Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2012.

REFERENCES:

Alex Berson and Stephen J.Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, 35th Reprint 2016.

K.P. Soman, Shyam Diwakar and V. Ajay, “Insight into Data Mining Theory and Practice”, Eastern Economy Edition, Prentice Hall of India, 2006.

Ian H.Witten and Eibe Frank, “Data Mining: Practical Machine Learning Tools and Techniques”, Elsevier, Second Edition.

IT8076 **SOFTWARE TESTING** **LTPC**
300 3

OBJECTIVES:

To learn the criteria for test cases.
To learn the design of test cases.
To understand test management and test automation techniques.
To apply test metrics and measurements.

UNIT I INTRODUCTION **9**

Testing as an Engineering Activity – Testing as a Process – Testing Maturity Model- Testing axioms – Basic definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design –Defect Examples- Developer/Tester Support of Developing a Defect Repository.

UNIT II TEST CASE DESIGN STRATEGIES **9**

Test case Design Strategies – Using Black Box Approach to Test Case Design – Boundary Value Analysis – Equivalence Class Partitioning – State based testing – Cause-effect graphing – Compatibility testing – user documentation testing – domain testing - Random Testing – Requirements based testing – Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – code complexity testing – Additional White box testing approaches- Evaluating Test Adequacy Criteria.

UNIT III LEVELS OF TESTING **9**

The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing –Compatibility testing – Testing the documentation – Website testing.

UNIT IV TEST MANAGEMENT **9**

People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group- The Structure of Testing Group- .The Technical Training Program.

UNIT V TEST AUTOMATION **9**

Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements – project, progress and productivity metrics.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the students will be able to:

Design test cases suitable for a software development for different domains.
Identify suitable tests to be carried out.
Prepare test planning based on the document.
Document test plans and test cases designed.
Use automatic testing tools.
Develop and validate a test plan.

TEXT BOOKS:

Srinivasan Desikan and Gopalaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson Education, 2006.

Ron Patton, “Software Testing”, Second Edition, Sams Publishing, Pearson Education, 2007. AU Library.com

REFERENCES:

Ilene Burnstein, “Practical Software Testing”, Springer International Edition, 2003.

Edward Kit,” Software Testing in the Real World – Improving the Process”, Pearson Education, 1995.

Boris Beizer,” Software Testing Techniques” – 2nd Edition, Van Nostrand Reinhold, New York, 1990.

Aditya P. Mathur, “Foundations of Software Testing _ Fundamental Algorithms and Techniques”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.

IT8072 EMBEDDED SYSTEMS LTPC
300 3

OBJECTIVES:

To learn the architecture and programming of ARM processor.

To become familiar with the embedded computing platform design and analysis.

To get thorough knowledge in interfacing concepts

To design an embedded system and to develop programs

UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS 9

Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Instruction sets preliminaries - ARM Processor – CPU: programming input and output- supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.

UNIT II EMBEDDED COMPUTING PLATFORM DESIGN 9

The CPU Bus-Memory devices and systems–Designing with computing platforms – consumer electronics architecture – platform-level performance analysis - Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

UNIT III SENSOR INTERFACING WITH ARDUINO 9

Basics of hardware design and functions of basic passive components-sensors and actuators-Arduino code - library file for sensor interfacing-construction of basic applications

UNIT IV EMBEDDED FIRMWARE 9

Reset Circuit, Brown-out Protection Circuit-Oscillator Unit - Real Time Clock-Watchdog Timer - Embedded Firmware Design Approaches and Development Languages.

UNIT V EMBEDDED C PROGRAMMING 9

Introduction-Creating ‘hardware delays’ using Timer 0 and Timer 1-Reading switches-Adding Structure to the code-Generating a minimum and maximum delay-Example: Creating a portable hardware delay- Timeout mechanisms-Creating loop timeouts-Testing loop timeouts- hardware timeouts-Testing a hardware timeout

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to:

Describe the architecture and programming of ARM processor.
Explain the concepts of embedded systems
Understand the Concepts of peripherals and interfacing of sensors.
Capable of using the system design techniques to develop firmware
Illustrate the code for constructing a system

TEXT BOOKS:

1.Marilyn Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012. (unit I & II)
https://www.coursera.org/learn/interface-with-arduino#syllabus (Unit III)
3 .Michael J. Pont, "Embedded C", 2 nd Edition, Pearson Education, 2008.(Unit IV & V)

REFERENCES:

1.Shibu K.V, "Introduction to Embedded Systems", McGraw Hill.2014
2.Jonathan W.Valvano, "Embedded Microcomputer Systems Real Time Interfacing", Third Edition Cengage Learning, 2012
3 Raj Kamal, "Embedded Systems-Architecture,programming and design", 3 edition,TMH.2015
4. Lyla, "Embedded Systems", Pearson , 2013
6. David E. Simon, "An Embedded Software Primer", Pearson Education,2000.

CS8072	AGILE METHODOLOGIES	L	T	P	C
		3	0	0	3

OBJECTIVES:

To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
To provide a good understanding of software design and a set of software technologies and APIs.
To do a detailed examination and demonstration of Agile development and testing techniques. To understand the benefits and pitfalls of working in an Agile team.
To understand Agile development and testing.

UNIT I AGILE METHODOLOGY 9

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

UNIT II AGILE PROCESSES 9

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT 9 Agile Information Systems – Agile Decision Making - Earl'S Schools of KM – Institutional

Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT IV AGILITY AND REQUIREMENTS ENGINEERING 9

Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V AGILITY AND QUALITY ASSURANCE 9

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Realize the importance of interacting with business stakeholders in determining the requirements for a software system

Perform iterative software development processes: how to plan them, how to execute them.

Point out the impact of social aspects on software development success.

Develop techniques and tools for improving team collaboration and software quality.

Perform Software process improvement as an ongoing task for development teams.

Show how agile approaches can be scaled up to the enterprise level.

TEXT BOOKS:

David J. Anderson and Eli Schragenheim, “Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results”, Prentice Hall, 2003.

Hazza and Dubinsky, “Agile Software Engineering, Series: Undergraduate Topics in Computer Science”, Springer, 2009.

REFERENCES:

Craig Larman, “Agile and Iterative Development: A Manager‘s Guide”, Addison-Wesley, 2004.

Kevin C. Desouza, “Agile Information Systems: Conceptualization, Construction, and Management”, Butterworth-Heinemann, 2007.

CS8077	GRAPH THEORY AND APPLICATIONS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand fundamentals of graph theory.

To study proof techniques related to various concepts in graphs.

To explore modern applications of graph theory.

UNIT I 9

Introduction - Graph Terminologies - Types of Graphs - Sub Graph- Multi Graph - Regular Graph - Isomorphism - Isomorphic Graphs - Sub-graph - Euler graph - Hamiltonian Graph - Related Theorems.

UNIT II 9

Trees -Properties- Distance and Centres - Types - Rooted Tree-- Tree Enumeration- Labeled Tree - Unlabeled Tree - Spanning Tree - Fundamental Circuits- Cut Sets - Properties - Fundamental Circuit and Cut-set- Connectivity- Separability -Related Theorems.

UNIT III **9**

Network Flows - Planar Graph - Representation - Detection - Dual Graph - Geometric and Combinatorial Dual - Related Theorems - Digraph - Properties - Euler Digraph.

UNIT IV **9**

Matrix Representation - Adjacency matrix- Incidence matrix- Circuit matrix - Cut-set matrix - Path Matrix- Properties - Related Theorems - Correlations. Graph Coloring - Chromatic Polynomial - Chromatic Partitioning - Matching - Covering - Related Theorems.

UNIT V **9**

Graph Algorithms- Connectedness and Components- Spanning Tree- Fundamental Circuits- Cut Vertices- Directed Circuits- Shortest Path - Applications overview.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the students should be able to

Understand the basic concepts of graphs, and different types of graphs

Understand the properties, theorems and be able to prove theorems.

Apply suitable graph model and algorithm for solving applications.

TEXT BOOKS:

Narsingh Deo, "Graph Theory with Application to Engineering and Computer Science", Prentice-Hall of India Pvt.Ltd, 2003.

L.R.Foulds , "Graph Theory Applications", Springer ,2016.

REFERENCES:

Bondy, J. A. and Murty, U.S.R., "Graph Theory with Applications", North Holland Publication,2008.

West, D. B., “Introduction to Graph Theory”, Pearson Education, 2011.

John Clark, Derek Allan Holton, “A First Look at Graph Theory”, World Scientific Publishing Company, 1991.

Diestel, R, "Graph Theory", Springer,3rd Edition,2006.

Kenneth H.Rosen, "Discrete Mathematics and Its Applications", Mc Graw Hill , 2007.

		L	T	P	C
IT8071	**DIGITAL SIGNAL PROCESSING**	**3**	**0**	**0**	**3**

OBJECTIVES:

To understand the basics of discrete time signals, systems and their classifications. To analyze the discrete time signals in both time and frequency domain.

To design lowpass digital IIR filters according to predefined specifications based on analog filter theory and analog-to-digital filter transformation.

To design Linear phase digital FIR filters using fourier method, window technique

To realize the concept and usage of DSP in various engineering fields.

UNIT I DISCRETE TIME SIGNALS AND SYSTEMS **9**

Introduction to DSP – Basic elements of DSP– Sampling of Continuous time signals–Representation, Operation and Classification of Discrete Time Signal–Classification of Discrete Time Systems– Discrete Convolution: Linear and Circular–Correlation.

UNIT II ANALYSIS OF LTI DISCRETE TIME SIGNALS AND SYSTEMS **9**

Analysis of LTI Discrete Time Systems using DFT–Properties of DFT–Inverse DFT– Analysis of LTI Discrete Time Systems using FFT Algorithms– Inverse DFT using FFT Algorithm.

UNIT III INFINITE IMPULSE RESPONSE FILTERS 9

Frequency response of Analog and Digital IIR filters–Realization of IIR filter–Design of analog low pass filter–Analog to Digital filter Transformation using Bilinear Transformation and Impulse Invariant method–Design of digital IIR filters (LPF, HPF, BPF, and BRF) using various transformation techniques.

UNIT IV FINITE IMPULSE RESPONSE FILTERS 9

Linear Phase FIR filter–Phase delay–Group delay–Realization of FIR filter–Design of Causal and Non-causal FIR filters (LPF, HPF, BPF and BRF) using Window method (Rectangular, Hamming window, Hanning window) –Frequency Sampling Technique.

UNIT V APPLICATIONS OF DSP 9

Multirate Signal Processing: Decimation, Interpolation, Spectrum of the sampled signal –Processing of Audio and Radar signal.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Perform mathematical operations on signals.

Understand the sampling theorem and perform sampling on continuous-time signals to get discrete time signal by applying advanced knowledge of the sampling theory.

Transform the time domain signal into frequency domain signal and vice-versa.

Apply the relevant theoretical knowledge to design the digital IIR/FIR filters for the given analog specifications.

TEXT BOOK:

John G. Proakis & Dimitris G.Manolakis, “Digital Signal Processing – Principles, Algorithms & Applications”, Fourth Edition, Pearson Education / Prentice Hall, 2007.

REFERENCES

Richard G. Lyons, “*Understanding Digital Signal Processing*”. Second Edition, Pearson Education.

A.V.Oppenheim, R.W. Schafer and J.R. Buck, “*Discrete-Time Signal Processing*”, 8th Indian Reprint, Pearson, 2004.

Emmanuel C.Ifeachor, & Barrie.W.Jervis, “*Digital Signal Processing*”, Second Edition, Pearson Education / Prentice Hall, 2002.

William D. Stanley, “Digital Signal Processing”, Second Edition, Reston Publications.

GE8075 INTELLECTUAL PROPERTY RIGHTS L T P C
3 0 0 3

OBJECTIVE:

To give an idea about IPR, registration and its enforcement.

UNIT I INTRODUCTION 9 Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights,

Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II REGISTRATION OF IPRs 10

Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad

UNIT III AGREEMENTS AND LEGISLATIONS 10

International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT IV DIGITAL PRODUCTS AND LAW 9

Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection – Unfair Competition – Meaning and Relationship between Unfair Competition and IP Laws – Case Studies.

UNIT V ENFORCEMENT OF IPRs 7

Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

TOTAL : 45 PERIODS

OUTCOME:

Ability to manage Intellectual Property portfolio to enhance the value of the firm.

TEXT BOOKS:

V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012

S. V. Satakar, “Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002

REFERENCES:

Deborah E. Bouchoux, “Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets”, Cengage Learning, Third Edition, 2012.

Prabuddha Ganguli,”Intellectual Property Rights: Unleashing the Knowledge Economy”, McGraw Hill Education, 2011.

Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

CS8091 BIG DATA ANALYTICS

L	T	P	C
3	0	0	3

OBJECTIVES:

To know the fundamental concepts of big data and analytics.

To explore tools and practices for working with big data

To learn about stream computing.

To know about the research that requires the integration of large amounts of data.

UNIT I INTRODUCTION TO BIG DATA 9

Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating

The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications - Perception and Quantification of Value -Understanding Big Data Storage - A General Overview of High-Performance Architecture - HDFS - MapReduce and YARN - Map Reduce Programming Model

UNIT II CLUSTERING AND CLASSIFICATION 9

Advanced Analytical Theory and Methods: Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions .- Classification: Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees in R - Naïve Bayes - Bayes’ Theorem - Naïve Bayes Classifier.

UNIT III ASSOCIATION AND RECOMMENDATION SYSTEM 9

Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association& finding similarity - Recommendation System: Collaborative Recommendation- Content Based Recommendation - Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT IV STREAM MEMORY 9

Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics

UNIT V NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION 9

NoSQL Databases : Schema-less Models": Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive - Sharding –- Hbase – Analyzing big data with twitter - Big data for E-Commerce Big data for blogs - Review of Basic Data Analytic Methods using R.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Work with big data tools and its analysis techniques

Analyze data by utilizing clustering and classification algorithms

Learn and apply different mining algorithms and recommendation systems for large volumes of data

Perform analytics on data streams

Learn NoSQL databases and management.

TEXT BOOKS:

Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.

REFERENCES:

EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.

Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.

Dietmar Jannach and Markus Zanker, "Recommender Systems: An Introduction", Cambridge University Press, 2010.

Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015.

Jimmy Lin and Chris Dyer, "Data-Intensive Text Processing with MapReduce", Synthesis Lectures on Human Language Technologies, Vol. 3, No. 1, Pages 1-177, Morgan Claypool publishers, 2010.

CS8082 MACHINE LEARNING TECHNIQUES LTPC
3 003

OBJECTIVES:

To understand the need for machine learning for various problem solving

To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning

To understand the latest trends in machine learning

To design appropriate machine learning algorithms for problem solving

UNIT I INTRODUCTION 9

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II NEURAL NETWORKS AND GENETIC ALGORITHMS 9

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III BAYESIAN AND COMPUTATIONAL LEARNING 9

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV INSTANT BASED LEARNING 9

K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

UNIT V ADVANCED LEARNING 9

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

TOTAL :45 PERIODS

OUTCOMES:

At the end of the course, the students will be able to

Differentiate between supervised, unsupervised, semi-supervised machine learning approaches

Discuss the decision tree algorithm and indentity and overcome the problem of overfitting

Discuss and apply the back propagation algorithm and genetic algorithms to various problems

Apply the Bayesian concepts to machine learning

Analyse and suggest appropriate machine learning approaches for various types of problems

TEXT BOOK:

Tom M. Mitchell, “Machine Learning”, McGraw-Hill Education (India) Private Limited, 2013 .

REFERENCES:

Ethem Alpaydin, “Introduction to Machine Learning (Adaptive Computation and Machine Learning)”, The MIT Press 2004.

Stephen Marsland, “Machine Learning: An Algorithmic Perspective”, CRC Press, 2009.

CS8092	COMPUTER GRAPHICS AND MULTIMEDIA	L	T	P	C
		3	0	0	3

OBJECTIVES:

To develop an understanding and awareness how issues such as content, information architecture, motion, sound, design, and technology merge to form effective and compelling interactive experiences for a wide range of audiences and end users.

To become familiar with various software programs used in the creation and implementation of multi- media

To appreciate the importance of technical ability and creativity within design practice. To gain knowledge about graphics hardware devices and software used.

To understand the two-dimensional graphics and their transformations.
To understand the three-dimensional graphics and their transformations. To appreciate illumination and color models

To become familiar with understand clipping techniques
To become familiar with Blender Graphics

UNIT I ILLUMINATION AND COLOR MODELS 9

Light sources - basic illumination models – halftone patterns and dithering techniques; Properties of light - Standard primaries and chromaticity diagram; Intuitive colour concepts - RGB colour model - YIQ colour model - CMY colour model - HSV colour model - HLS colour model; Colour selection. Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.

UNIT II TWO-DIMENSIONAL GRAPHICS 9

Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; window-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations – point, line, and polygon clipping algorithms.

UNIT III THREE-DIMENSIONAL GRAPHICS 9

Three dimensional concepts; Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations - Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces -B-Spline curves and surfaces. TRANSFORMATION AND VIEWING: Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations; Three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods.

UNIT IV MULTIMEDIA SYSTEM DESIGN & MULTIMEDIA FILE HANDLING 9

Multimedia basics **−** Multimedia applications **−** Multimedia system architecture **−** Evolving technologies for multimedia **− Defining objects for multimedia systems − Multimedia data interface** standards **− Multimedia databases. Compression and decompression − Data and file format** standards **− Multimedia I/O technologies − Digital voice and audio − Video image and animation −** Full motion video **− Storage and retrieval technologies.**

UNIT V HYPERMEDIA 9

Multimedia authoring and user interface - Hypermedia messaging -Mobile messaging **−** Hypermedia message component **−** Creating hypermedia message **−** Integrated multimedia message standards **− Integrated document management − Distributed multimedia systems.CASE STUDY: BLENDER GRAPHICS** Blender Fundamentals – Drawing Basic Shapes – Modelling – Shading & Textures

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Design two dimensional graphics.

Apply two dimensional transformations.

Design three dimensional graphics.

Apply three dimensional transformations.

Apply Illumination and color models.

Apply clipping techniques to graphics.

Understood Different types of Multimedia File Format

Design Basic 3d Scenes using Blender

TEXT BOOKS:

Donald Hearn and Pauline Baker M, “Computer Graphics", Prentice Hall, New Delhi, 2007 [UNIT I – III]

Andleigh, P. K and Kiran Thakrar, “Multimedia Systems and Design”, PHI, 2003. [UNIT IV,V]

REFERENCES:

Judith Jeffcoate, “Multimedia in practice: Technology and Applications”, PHI, 1998.

Foley, Vandam, Feiner and Hughes, “Computer Graphics: Principles and Practice”, 2nd Edition, Pearson Education, 2003.

Jeffrey McConnell, “Computer Graphics: Theory into Practice”, Jones and Bartlett Publishers,2006.

Hill F S Jr., "Computer Graphics", Maxwell Macmillan , 1990.

Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, KelvinSung, and AK Peters, “Fundamentals of Computer Graphics”, CRC Press, 2010.

William M. Newman and Robert F.Sproull, “Principles of Interactive Computer Graphics”, Mc Graw Hill 1978.

https://www.blender.org/support/tutorials/

IT8075	SOFTWARE PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the Software Project Planning and Evaluation techniques.

To plan and manage projects at each stage of the software development life cycle (SDLC).

To learn about the activity planning and risk management principles.

To manage software projects and control software deliverables.

To develop skills to manage the various phases involved in project management and people management.

To deliver successful software projects that support organization’s strategic goals.

UNIT I PROJECT EVALUATION AND PROJECT PLANNING 9

Importance of Software Project Management – Activities - Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

UNIT II PROJECT LIFE CYCLE AND EFFORT ESTIMATION 9

Software process and Process Models – Choice of Process models - Rapid Application development – Agile methods – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II - a Parametric Productivity Model.

UNIT III ACTIVITY PLANNING AND RISK MANAGEMENT 9

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules.

UNIT IV PROJECT MANAGEMENT AND CONTROL 9

Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management.

UNIT V STAFFING IN SOFTWARE PROJECTS 9

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.

TOTAL 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Understand Project Management principles while developing software.

Gain extensive knowledge about the basic project management concepts, framework and the process models.

Obtain adequate knowledge about software process models and software effort estimation techniques.

Estimate the risks involved in various project activities.

Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.

Learn staff selection process and the issues related to people management

TEXT BOOK:

Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

REFERENCES:

Robert K. Wysocki “Effective Software Project Management” – Wiley Publication, 2011.

Walker Royce: “Software Project Management”- Addison-Wesley, 1998.

Gopalaswamy Ramesh, “Managing Global Software Projects” – McGraw Hill Education (India), Fourteenth Reprint 2013.

CS8081 **INTERNET OF THINGS** **LTPC**
3003

OBJECTIVES:

To understand Smart Objects and IoT Architectures
To learn about various IOT-related protocols
To build simple IoT Systems using Arduino and Raspberry Pi.
To understand data analytics and cloud in the context of IoT
To develop IoT infrastructure for popular applications

UNIT I FUNDAMENTALS OF IoT **9**

Evolution of Internet of Things - Enabling Technologies – IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models – Simplified IoT Architecture and Core IoT Functional Stack -– Fog, Edge and Cloud in IoT – Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT II IoT PROTOCOLS **9**

IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT

UNIT III DESIGN AND DEVELOPMENT **9**

Design Methodology - Embedded computing logic - Microcontroller, System on Chips - IoT system building blocks - Arduino - Board details, IDE programming - Raspberry Pi - Interfaces and Raspberry Pi with Python Programming.

UNIT IV DATA ANALYTICS AND SUPPORTING SERVICES **9**

Structured Vs Unstructured Data and Data in Motion Vs Data in Rest – Role of Machine Learning – No SQL Databases – Hadoop Ecosystem – Apache Kafka, Apache Spark – Edge Streaming Analytics and Network Analytics – Xively Cloud for IoT, Python Web Application Framework – Django – AWS for IoT – System Management with NETCONF-YANG

UNIT V CASE STUDIES/INDUSTRIAL APPLICATIONS **9**

Cisco IoT system - IBM Watson IoT platform – Manufacturing - Converged Plantwide Ethernet Model (CPwE) – Power Utility Industry – GridBlocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

Explain the concept of IoT.
Analyze various protocols for IoT.
Design a PoC of an IoT system using Rasperry Pi/Arduino
Apply data analytics and use cloud offerings related to IoT. Analyze applications of IoT in real time scenario

TEXTBOOK:

David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, “IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017

REFERENCES:

Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015

Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012 (for Unit 2).

Jan Ho¨ ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.

Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet of Things”, Springer, 2011.

Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O'Reilly Media, 2011.

https://www.arduino.cc/

https://www.ibm.com/smarterplanet/us/en/?ca=v_smarterplanet

IT8074 SERVICE ORIENTED ARCHITECTURE LTPC
3 003

OBJECTIVES:

To learn fundamentals of XML

To provide an overview of Service Oriented Architecture and Web services and their importance

To learn web services standards and technologies

To learn service oriented analysis and design for developing SOA based applications

UNIT I XML 9

XML document structure – Well-formed and valid documents – DTD – XML Schema – Parsing XML using DOM, SAX – XPath - XML Transformation and XSL – Xquery

UNIT II SERVICE ORIENTED ARCHITECTURE (SOA) BASICS 9

Characteristics of SOA, Benefits of SOA , Comparing SOA with Client-Server and Distributed architectures –--- Principles of Service Orientation – Service layers

UNIT III WEB SERVICES (WS) AND STANDARDS 8

Web Services Platform – Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Service-Level Interaction Patterns – Orchestration and Choreography

UNIT IV WEB SERVICES EXTENSIONS 8

WS-Addressing - WS-ReliableMessaging - WS-Policy – WS-Coordination – WS -Transactions - WS-Security - Examples

UNIT V SERVICE ORIENTED ANALYSIS AND DESIGN 11

SOA delivery strategies – Service oriented analysis – Service Modelling – Service oriented design – Standards and composition guidelines -- Service design – Business process design – Case Study

TOTAL : 45 PERIODS

OUTCOMES:

Upon successful completion of this course, the students will be able to:

Understand XML technologies

Understand service orientation, benefits of SOA

Understand web services and WS standards

Use web services extensions to develop solutions

Understand and apply service modeling, service oriented analysis and design for application development

TEXTBOOKS:

Thomas Erl, " Service Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005

Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004

REFERENCES:

James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, "Java Web Services Architecture", Elsevier, 2003.

Ron Schmelzer et al. " XML and Web Services", Pearson Education, 2002.

Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002

GE8077 TOTAL QUALITY MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:

To facilitate the understanding of Quality Management principles and process.

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.

UNIT II TQM PRINCIPLES 9

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I 9

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II 9

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM 9

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation—Documentation—Internal Audits—Registration- **ENVIRONMENTAL MANAGEMENT SYSTEM:** Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001—Benefits of EMS.

TOTAL: 45 PERIODS

OUTCOME:

The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXT BOOK:

Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, “Total Quality Management”, Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

REFERENCES:

James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.

Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.

ISO9001-2015 standards

CS8083 MULTI-CORE ARCHITECTURES AND PROGRAMMING LTPC
3 003

OBJECTIVES:

To understand the need for multi-core processors, and their architecture.

To understand the challenges in parallel and multi-threaded programming.

To learn about the various parallel programming paradigms,

To develop multicore programs and design parallel solutions.

UNIT I MULTI-CORE PROCESSORS 9

Single core to Multi-core architectures – SIMD and MIMD systems – Interconnection networks - Symmetric and Distributed Shared Memory Architectures – Cache coherence - Performance Issues – Parallel program design.

UNIT II PARALLEL PROGRAM CHALLENGES 9

Performance – Scalability – Synchronization and data sharing – Data races – Synchronization primitives (mutexes, locks, semaphores, barriers) – deadlocks and livelocks – communication between threads (condition variables, signals, message queues and pipes).

UNIT III SHARED MEMORY PROGRAMMING WITH OpenMP 9

OpenMP Execution Model – Memory Model – OpenMP Directives – Work-sharing Constructs - Library functions – Handling Data and Functional Parallelism – Handling Loops - Performance Considerations.

UNIT IV DISTRIBUTED MEMORY PROGRAMMING WITH MPI 9

MPI program execution – MPI constructs – libraries – MPI send and receive – Point-to-point and Collective communication – MPI derived datatypes – Performance evaluation

UNIT V PARALLEL PROGRAM DEVELOPMENT 9

Case studies - n-Body solvers – Tree Search – OpenMP and MPI implementations and comparison.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Describe multicore architectures and identify their characteristics and challenges. Identify the issues in programming Parallel Processors.

Write programs using OpenMP and MPI.

Design parallel programming solutions to common problems.

Compare and contrast programming for serial processors and programming for parallel processors.

TEXT BOOKS:

Peter S. Pacheco, “An Introduction to Parallel Programming”, Morgan-Kauffman/Elsevier, 2011.

Darryl Gove, “Multicore Application Programming for Windows, Linux, and Oracle Solaris”, Pearson, 2011 (unit 2)

REFERENCES:

Michael J Quinn, “Parallel programming in C with MPI and OpenMP”, Tata McGraw Hill,2003.

Victor Alessandrini, Shared Memory Application Programming, 1st Edition, Concepts and Strategies in Multicore Application Programming, Morgan Kaufmann, 2015.

Yan Solihin, Fundamentals of Parallel Multicore Architecture, CRC Press, 2015.

CS8079 HUMAN COMPUTER INTERACTION LTPC
30 03

OBJECTIVES:

To learn the foundations of Human Computer Interaction.

To become familiar with the design technologies for individuals and persons with disabilities.

To be aware of mobile HCI.

To learn the guidelines for user interface.

UNIT I FOUNDATIONS OF HCI 9

The Human: I/O channels – Memory – Reasoning and problem solving; **The Computer:** Devices – Memory – processing and networks; **Interaction:** Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. - **Case Studies**

UNIT II DESIGN & SOFTWARE PROCESS 9

Interactive Design: Basics – process – scenarios – navigation – screen design – Iteration and prototyping. **HCI in software process:** Software life cycle – usability engineering – Prototyping in practice – design rationale. **Design rules:** principles, standards, guidelines, rules. **Evaluation Techniques** – **Universal Design**

UNIT III MODELS AND THEORIES 9

HCI Models: Cognitive models: Socio-Organizational issues and stakeholder requirements – Communication and collaboration models-**Hypertext, Multimedia and WWW**.

UNIT IV MOBILE HCI 9 Mobile Ecosystem: Platforms, Application frameworks- **Types of Mobile Applications:** Widgets,

Applications, Games- Mobile Information Architecture, Mobile 2.0, **Mobile Design:** Elements of Mobile Design, Tools. - **Case Studies**

UNIT V WEB INTERFACE DESIGN 9

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - **Case Studies**

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, the students should be able to:

Design effective dialog for HCI

Design effective HCI for individuals and persons with disabilities. Assess the importance of user feedback.

Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites. Develop meaningful user interface.

TEXT BOOKS:

Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2004 (UNIT I, II & III)

Brian Fling, “Mobile Design and Development”, First Edition, O’Reilly Media Inc., 2009 (UNIT – IV)

Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O’Reilly, 2009. (UNIT-V)

CS8073	C# AND .NET PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To learn basic programming in C# and the object oriented programming concepts.

To update and enhance skills in writing Windows applications, ADO.NET and ASP .NET.

To study the advanced concepts in data connectivity, WPF, WCF and WWF with C# and .NET 4.5.

To implement mobile applications using .Net compact framework

To understand the working of base class libraries, their operations and manipulation of data using XML.

UNIT I C# LANGUAGE BASICS 9

.Net Architecture - Core C# - Variables - Data Types - Flow control - Objects and Types- Classes and Structs - Inheritance- Generics – Arrays and Tuples - Operators and Casts - Indexers

UNIT II C# ADVANCED FEATURES 9

Delegates - Lambdas - Lambda Expressions - Events - Event Publisher - Event Listener - Strings and Regular Expressions - Generics - Collections - Memory Management and Pointers - Errors and Exceptions - Reflection

UNIT III BASE CLASS LIBRARIES AND DATA MANIPULATION 9

Diagnostics -Tasks, Threads and Synchronization - .Net Security - Localization - Manipulating XML- SAX and DOM - Manipulating files and the Registry- Transactions - ADO.NET- Peer-to-Peer Networking - PNRP - Building P2P Applications - Windows Presentation Foundation (WPF).

UNIT IV WINDOW BASED APPLICATIONS, WCF AND WWF 9

Window based applications - Core ASP.NET- ASP.NET Web forms -Windows Communication Foundation (WCF)- Introduction to Web Services - .Net Remoting - Windows Service - Windows Workflow Foundation (WWF) - Activities – Workflows

UNIT V .NET FRAMEWORK AND COMPACT FRAMEWORK 9

Assemblies - Shared assemblies - Custom Hosting with CLR Objects - Appdomains - Core XAML - Bubbling and Tunneling Events- Reading and Writing XAML - .Net Compact Framework - Compact Edition Data Stores – Errors, Testing and Debugging – Optimizing performance – Packaging and Deployment – Networking and Mobile Devices

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Write various applications using C# Language in the .NET Framework.

Develop distributed applications using .NET Framework.

Create mobile applications using .NET compact Framework.

TEXT BOOKS:

Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner . —Professional C# 2012 and .NET 4.5**‖, Wiley, 2012**

Harsh Bhasin, —Programming in C#‖, Oxford University Press, 2014.

REFERENCES

Ian Gariffiths, Mathew Adams, Jesse Liberty, —Programming C# 4.0‖, O'Reilly, Fourth Edition, 2010.

Andrew Troelsen, Pro C# 5.0 and the .NET 4.5 Framework, Apress publication, 2012.

Andy Wigley, Daniel Moth, Peter Foot, **—Mobile Development Handbook‖, Microsoft** Press, 2011.

CS8088 WIRELESS ADHOC AND SENSOR NETWORKS LTPC

3 003

OBJECTIVES:

To learn about the issues and challenges in the design of wireless ad hoc networks.

To understand the working of MAC and Routing Protocols for ad hoc and sensor networks

To learn about the Transport Layer protocols and their QoS for ad hoc and sensor networks.

To understand various security issues in ad hoc and sensor networks and the corresponding solutions.

UNIT I MAC & ROUTING IN AD HOC NETWORKS 9

Introduction – Issues and challenges in ad hoc networks – MAC Layer Protocols for wireless ad hoc networks – Contention-Based MAC protocols – MAC Protocols Using Directional Antennas – Multiple-Channel MAC Protocols – Power-Aware MAC Protocols – Routing in Ad hoc Networks – Design Issues – Proactive, Reactive and Hybrid Routing Protocols

UNIT II TRANSPORT & QOS IN AD HOC NETWORKS 9

TCP**"s challenges and Design Issues in Ad Hoc Networks** – Transport protocols for ad hoc networks – Issues and Challenges in providing QoS – MAC Layer QoS solutions – Network Layer QoS solutions – QoS Model

UNIT III MAC & ROUTING IN WIRELESS SENSOR NETWORKS 9

Introduction – Applications – Challenges – Sensor network architecture – MAC Protocols for wireless sensor networks – Low duty cycle protocols and wakeup concepts – Contention-Based protocols – Schedule-Based protocols – IEEE 802.15.4 Zigbee – Topology Control – Routing Protocols

UNIT IV TRANSPORT & QOS IN WIRELESS SENSOR NETWORKS 9

Data-Centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Congestion Control in network processing – Operating systems for wireless sensor networks – Examples

UNIT V SECURITY IN AD HOC AND SENSOR NETWORKS 9

Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Anti-tamper techniques – Water marking techniques – Defense against routing attacks - Secure Ad hoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Identify different issues in wireless ad hoc and sensor networks .

To analyze protocols developed for ad hoc and sensor networks .

To identify and understand security issues in ad hoc and sensor networks.

TEXT BOOKS:

C.Siva Ram Murthy and B.S.Manoj, "Ad Hoc Wireless Networks – Architectures and 2 Protocols", Pearson Education, 2006.

Holger Karl, Andreas Willing, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, Inc., 2005.

REFERENCES

Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, "Ad Hoc Mobile Wireless Networks", Auerbach Publications, 2008.

Carlos De Morais Cordeiro, Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition)", World Scientific Publishing, 2011.

Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks Theory and Practice", John Wiley and Sons, 2010

Xiang-Yang Li , **"**Wireless Ad Hoc and Sensor Networks: Theory and Applications", 1227 th edition, Cambridge university Press,2008.

CS8071 ADVANCED TOPICS ON DATABASES LTPC

3 003

OBJECTIVES:

To learn the modeling and design of databases.

To acquire knowledge on parallel and distributed databases and their applications. To study the usage and applications of Object Oriented and Intelligent databases. To understand the usage of advanced data models.

To learn emerging databases such as XML, Cloud and Big Data.

To acquire inquisitive attitude towards research topics in databases.

UNIT I PARALLEL AND DISTRIBUTED DATABASES 9

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Design of Parallel Systems- Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Case Studies

UNIT II OBJECT AND OBJECT RELATIONAL DATABASES 9

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL –

OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL/Oracle – Case Studies.

UNIT III INTELLIGENT DATABASES 9

Active Databases: Syntax and Semantics (Starburst, Oracle, DB2)- Taxonomy- Applications- Design Principles for Active Rules- Temporal Databases: Overview of Temporal Databases- TSQL2- Deductive Databases: Logic of Query Languages – Datalog- Recursive Rules-Syntax and Semantics of Datalog Languages- Implementation of Rules and Recursion- Recursive Queries in SQL- Spatial Databases- Spatial Data Types- Spatial Relationships- Spatial Data Structures- Spatial Access Methods- Spatial DB Implementation.

UNIT IV ADVANCED DATA MODELS 9

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models -Concurrency Control - Transaction Commit Protocols- Multimedia Databases- Information Retrieval- Data Warehousing- Data Mining- Text Mining.

UNIT V EMERGING TECHNOLOGIES 9

XML Databases: XML-Related Technologies-XML Schema- XML Query Languages- Storing XML in Databases-XML and SQL- Native XML Databases- Web Databases- Geographic Information Systems- Biological Data Management- Cloud Based Databases: Data Storage Systems on the Cloud- Cloud Storage Architectures-Cloud Data Models- Query Languages- Introduction to Big Data-Storage-Analysis.

TOTAL: 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able,

To develop in-depth understanding of relational databases and skills to optimize database performance in practice.

To understand and critique on each type of databases.

To design faster algorithms in solving practical database problems.

To implement intelligent databases and various data models.

TEXT BOOKS:

1. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Sixth Edition , Pearson, 2011.

   Thomas Cannolly and Carolyn Begg, “Database Systems, A Practical Approach to Design, Implementation and Management”, Fourth Edition, Pearson Education, 2008.

REFERENCES:

Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Sixth Edition, McGraw Hill, 2011.

2. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.

   Carlo Zaniolo, Stefano Ceri, Christos Faloutsos, Richard T.Snodgrass, V.S.Subrahmanian, Roberto Zicari, “Advanced Database Systems”, Morgan Kaufmann publishers,2006.

GE8072	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the global trends and development methodologies of various types of

products and services

To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems

To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification

To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics

To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends - Environmental Trends - Political/Policy Trends **- Introduction to Product Development Methodologies and Management -** Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies Product Life Cycle – Product Development Planning and Management.

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9

Requirement Engineering - Types of Requirements - Requirement Engineering - traceability Matrix and Analysis - Requirement Management - **System Design & Modeling -** Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design.

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – **Challenges in Integration of Engineering Disciplines** - Concept Screening & Evaluation - **Detailed Design -** Component Design and Verification – **Mechanical, Electronics and Software Subsystems** - High Level Design/Low Level Design of S/W Program **-** Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – **Prototyping -** Introduction to Rapid Prototyping and Rapid Manufacturing - **System Integration, Testing, Certification and Documentation**

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product Validation processes and stages - Product Testing Standards and Certification - Product Documentation **Sustenance -**Maintenance and Repair – Enhancements - **Product EoL -** Obsolescence Management – Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product Development in Industry versus Academia –**The IPD Essentials -** Introduction to Vertical Specific Product Development processes -Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and Software Systems – Product Development Trade-offs - Intellectual Property Rights and Confidentiality – Security and Configuration Management.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Define, formulate and analyze a problem

Solve specific problems independently or as part of a team

Gain knowledge of the Innovation & Product Development process in the Business Context

Work independently as well as in teams

Manage a project from start to finish

TEXTBOOKS:

Book specially prepared by NASSCOM as per the MoU.

Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, Fifth Edition, 2011.

John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill, Eleventh Edition, 2005.

REFERENCES:

Hiriyappa B, “Corporate Strategy – Managing the Business”, Author House, 2013.

Peter F Drucker, “People and Performance”, Butterworth – Heinemann [Elsevier], Oxford, 2004.

Vinod Kumar Garg and Venkita Krishnan N K, “Enterprise Resource Planning – Concepts”, Second Edition, Prentice Hall, 2003.

Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, Seventh Edition, 2013

GE8074 HUMAN RIGHTS LTPC 3003

OBJECTIVE :

To sensitize the Engineering students to various aspects of Human Rights.

UNIT I **9**

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II **9**

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III **9**

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV **9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO’s, Media, Educational Institutions, Social Movements.

TOTAL: 45 PERIODS

OUTCOME:

Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

Kapoor S.K., “Human Rights under International law and Indian Laws”, Central Law Agency, Allahabad, 2014.

Chandra U., “Human Rights”, Allahabad Law Agency, Allahabad, 2014.

Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

GE8071 DISASTER MANAGEMENT LTPC
3 003

OBJECTIVES:

To provide students an exposure to disasters, their significance and types.

To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction

To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR) To enhance awareness of institutional processes in the country and

To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj

Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD

WORKS 9 Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

Differentiate the types of disasters, causes and their impact on environment and society

Assess vulnerability and various methods of risk reduction measures as well as mitigation.

Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

TEXTBOOKS:

Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423

Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]

Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011

Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES

Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005

Government of India, National Disaster Management Policy,2009.

EC8093	DIGITAL IMAGE PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To become familiar with digital image fundamentals

To get exposed to simple image enhancement techniques in Spatial and Frequency domain.

To learn concepts of degradation function and restoration techniques.

To study the image segmentation and representation techniques.

To become familiar with image compression and recognition methods

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.

UNIT II IMAGE ENHANCEMENT 9

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.

UNIT III IMAGE RESTORATION 9

Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering

UNIT IV IMAGE SEGMENTATION 9

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V IMAGE COMPRESSION AND RECOGNITION 9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to:

Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.

Operate on images using the techniques of smoothing, sharpening and enhancement. Understand the restoration concepts and filtering techniques.

Learn the basics of segmentation, features extraction, compression and recognition methods for color models.

TEXT BOOKS:

Rafael C. Gonzalez, Richard E. Woods, 'Digital Image Processing', Pearson, Third Edition, 2010.

Anil K. Jain, 'Fundamentals of Digital Image Processing', Pearson, 2002.

REFERENCES:

Kenneth R. Castleman, 'Digital Image Processing', Pearson, 2006.

Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, 'Digital Image Processing using MATLAB', Pearson Education, Inc., 2011.

D,E. Dudgeon and RM. Mersereau, 'Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.

William K. Pratt, 'Digital Image Processing', John Wiley, New York, 2002

Milan Sonka et al 'Image processing, analysis and machine vision', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

CS8085 SOCIAL NETWORK ANALYSIS L T P C
3 0 0 3

OBJECTIVES:

To understand the concept of semantic web and related applications. To learn knowledge representation using ontology.

To understand human behaviour in social web and related communities.

To learn visualization of social networks.

UNIT I INTRODUCTION 9

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis

Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

UNIT II MODELLING, AGGREGATING AND KNOWLEDGE

REPRESENTATION 9 Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

UNIT III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL

NETWORKS 9 Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting

communities social network infrastructures and communities - Decentralized online social networks - Multi-Relational characterization of dynamic social network communities.

UNIT IV PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES 9

Understanding and predicting human behaviour for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS 9

Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students should be able to:

Develop semantic web related applications.

Represent knowledge using ontology.

Predict human behaviour in social web and related communities.

Visualize social networks.

TEXT BOOKS:

Peter Mika, "Social Networks and the Semantic Web", First Edition, Springer 2007.

Borko Furht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.

REFERENCES:

Guandong Xu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition, Springer, 2011.

Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.

Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.

John G. Breslin, Alexander Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

IT8073	INFORMATION SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the basics of Information Security

To know the legal, ethical and professional issues in Information Security

To know the aspects of risk management

To become aware of various standards in this area

To know the technological aspects of Information Security

UNIT I INTRODUCTION 9

History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II SECURITY INVESTIGATION 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues - An Overview of Computer Security - Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies

UNIT III SECURITY ANALYSIS 9

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk - Systems: Access Control Mechanisms, Information Flow and Confinement Problem

UNIT IV LOGICAL DESIGN 9

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V PHYSICAL DESIGN 9

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

TOTAL 45 PERIODS

OUTCOMES:

At the end of this course, the students should be able to:

Discuss the basics of information security

Illustrate the legal, ethical and professional issues in information security Demonstrate the aspects of risk management.

Become aware of various standards in the Information Security System Design and implementation of Security Techniques.

TEXT BOOK:

Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, 2003

REFERENCES

Micki Krause, Harold F. Tipton, “ Handbook of Information Security Management”, Vol 1-3 CRCPress LLC, 2004.

Stuart McClure, Joel Scrambray, George Kurtz, “Hacking Exposed”, Tata McGraw-Hill, 2003

Matt Bishop, “ Computer Security Art and Science”, Pearson/PHI, 2002.

CS8087	SOFTWARE DEFINED NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To learn the fundamentals of software defined networks.

To understand the separation of the data plane and the control plane.

To study about the SDN Programming.

To study about the various applications of SDN

UNIT I INTRODUCTION 9

History of Software Defined Networking (SDN) – Modern Data Center – Traditional Switch Architecture – Why SDN – Evolution of SDN – How SDN Works – Centralized and Distributed Control and Date Planes

UNIT II OPEN FLOW & SDN CONTROLLERS 9

Open Flow Specification – Drawbacks of Open SDN, SDN via APIs, SDN via Hypervisor-

Based Overlays – SDN via Opening up the Device – SDN Controllers – General Concepts

UNIT III DATA CENTERS **9**

Multitenant and Virtualized Multitenant Data Center – SDN Solutions for the Data Center Network – VLANs – EVPN – VxLAN – NVGRE

UNIT IV SDN PROGRAMMING **9**

Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs – Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications

UNIT V SDN **9**

Juniper SDN Framework – IETF SDN Framework – Open Daylight Controller – Floodlight Controller – Bandwidth Calendaring – Data Center Orchestration

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Analyze the evolution of software defined networks

Express the various components of SDN and their uses

Explain the use of SDN in the current networking scenario

Design and develop various applications of SDN

TEXT BOOKS:

Paul Goransson and Chuck Black, —Software Defined Networks: A Comprehensive Approach, First Edition, Morgan Kaufmann, 2014.

Thomas D. Nadeau, Ken Gray, **—SDN: Software Defined Networks**, O'Reilly Media, 2013.

REFERENCES:

Siamak Azodolmolky, —Software Defined Networking with Open Flow, Packet Publishing, 2013.

Vivek Tiwari, —SDN and Open Flow for Beginnersll, Amazon Digital Services, Inc., 2013.

Fei Hu, Editor, —Network Innovation through Open Flow and SDN: Principles and Design, CRC Press, 2014.

CS8074	**CYBER FORENSICS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

To learn computer forensics

To become familiar with forensics tools

To learn to analyze and validate forensics data

UNIT I INTRODUCTION TO COMPUTER FORENSICS **9**

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT II EVIDENCE COLLECTION AND FORENSICS TOOLS **9**

Processing Crime and Incident Scenes – Working with Windows and DOS Systems.

Current Computer Forensics Tools: Software/ Hardware Tools.

UNIT III ANALYSIS AND VALIDATION 9

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

UNIT IV ETHICAL HACKING 9

Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats - Sniffing

UNIT V ETHICAL HACKING IN WEB 9

Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

TOTAL 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Understand the basics of computer forensics

Apply a number of different computer forensic tools to a given scenario Analyze and validate forensics data

Identify the vulnerabilities in a given network infrastructure

Implement real-world hacking techniques to test system security

TEXT BOOKS:

Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, “Computer Forensics and Investigations”, Cengage Learning, India Edition, 2016.

CEH official Certfied Ethical Hacking Review Guide, Wiley India Edition, 2015.

REFERENCES

John R.Vacca, “Computer Forensics”, Cengage Learning, 2005

MarjieT.Britz, “Computer Forensics and Cyber Crime”: An Introduction”, 3rd Edition, Prentice Hall, 2013.

AnkitFadia “ Ethical Hacking” Second Edition, Macmillan India Ltd, 2006

Kenneth C.Brancik “Insider Computer Fraud” Auerbach Publications Taylor & Francis Group–2008.

CS8086 SOFT COMPUTING L T P C
3 0 0 3

OBJECTIVES:

To learn the basic concepts of Soft Computing

To become familiar with various techniques like neural networks, genetic algorithms and fuzzy systems.

To apply soft computing techniques to solve problems.

UNIT I INTRODUCTION TO SOFT COMPUTING 9

Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network.

UNIT II ARTIFICIAL NEURAL NETWORKS 9

Back propagation Neural Networks - Kohonen Neural Network -Learning Vector Quantization -Hamming Neural Network - Hopfield Neural Network- Bi-directional

Associative Memory -Adaptive Resonance Theory Neural Networks- Support Vector Machines - Spike Neuron Models.

UNIT III FUZZY SYSTEMS 9

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations -Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures - Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.

UNIT IV GENETIC ALGORITHMS 9

Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction - Inheritance Operators - Cross Over - Inversion and Deletion -Mutation Operator - Bit-wise Operators -Convergence of Genetic Algorithm.

UNIT V HYBRID SYSTEMS 9 Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic - GA Based Weight Determination - LR-Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture -

Learning in Fuzzy BP- Inference by Fuzzy BP - Fuzzy ArtMap: A Brief Introduction - Soft Computing Tools - GA in Fuzzy Logic Controller Design - Fuzzy Logic Controller

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the students should be able to

Apply suitable soft computing techniques for various applications.
Integrate various soft computing techniques for complex problems.

TEXT BOOKS:

N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.

S.N.Sivanandam , S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt. Ltd., 2nd Edition, 2011.

S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt. Ltd., 2017.

REFERENCES:

Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2002.

Kwang H.Lee, “First course on Fuzzy Theory and Applications”, Springer, 2005.

George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1996.

James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Addison Wesley, 2003.

GE8076 PROFESSIONAL ETHICS IN ENGINEERING LTPC 3003

OBJECTIVES:

To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES 10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS **9**

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION **9**

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS **9**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES **8**

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXT BOOKS:

Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.

Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.

Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.

John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003

Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.

World Community Service Centre, ' Value Education', Vethathiri publications, Erode, 2011.

Web sources:

www.onlineethics.org
www.nspe.org
www.globalethics.org
www.ethics.org

CS8080 INFORMATION RETRIEVAL TECHNIQUES LT PC 3003

OBJECTIVES:

To understand the basics of Information Retrieval.

To understand machine learning techniques for text classification and clustering.

To understand various search engine system operations.

To learn different techniques of recommender system.

UNIT I INTRODUCTION 9

Information Retrieval – Early Developments – The IR Problem – The User's Task – Information versus Data Retrieval - The IR System – The Software Architecture of the IR System – The Retrieval and Ranking Processes - The Web – The e-Publishing Era – How the web changed Search – Practical Issues on the Web – How People Search – Search Interfaces Today – Visualization in Search Interfaces.

UNIT II MODELING AND RETRIEVAL EVALUATION 9 Basic IR Models - Boolean Model - TF-IDF (Term Frequency/Inverse Document Frequency)

Weighting - Vector Model – Probabilistic Model – Latent Semantic Indexing Model – Neural Network Model – Retrieval Evaluation – Retrieval Metrics – Precision and Recall – Reference Collection – User-based Evaluation – Relevance Feedback and Query Expansion – Explicit Relevance Feedback.

UNIT III TEXT CLASSIFICATION AND CLUSTERING 9 A Characterization of Text Classification – Unsupervised Algorithms: Clustering – Naïve Text

Classification – Supervised Algorithms – Decision Tree – k-NN Classifier – SVM Classifier – Feature Selection or Dimensionality Reduction – Evaluation metrics – Accuracy and Error – Organizing the classes – Indexing and Searching – Inverted Indexes – Sequential Searching – Multi-dimensional Indexing.

UNIT IV WEB RETRIEVAL AND WEB CRAWLING 9

The Web – Search Engine Architectures – Cluster based Architecture – Distributed Architectures – Search Engine Ranking – Link based Ranking – Simple Ranking Functions – Learning to Rank – Evaluations -- Search Engine Ranking – Search Engine User Interaction – Browsing – Applications of a Web Crawler – Taxonomy – Architecture and Implementation – Scheduling Algorithms – Evaluation.

UNIT V RECOMMENDER SYSTEM 9

Recommender Systems Functions – Data and Knowledge Sources – Recommendation Techniques – Basics of Content-based Recommender Systems – High Level Architecture – Advantages and Drawbacks of Content-based Filtering – Collaborative Filtering – Matrix factorization models – Neighborhood models.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Use an open source search engine framework and explore its capabilities Apply appropriate method of classification or clustering.

Design and implement innovative features in a search engine. Design and implement a recommender system.

TEXT BOOKS:

Ricardo Baeza-Yates and Berthier Ribeiro-**Neto, —Modern Information Retrieval: The Concep**ts and Technology behind Search, Second Edition, ACM Press Books, 2011.

Ricci, F, Rokach, L. Shapira, B.Kantor, "Recommender Systems Handbook", First Edition, 2011.

REFERENCES:

C. Manning, P. Raghavan, and H. Schütze, **—Introduction to Information Retrieval, Cambridge** University Press, 2008.

Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, —Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.

CS8078	GREEN COMPUTING	L	TP		C
		3	0	0	3

OBJECTIVES:

To learn the fundamentals of Green Computing.

To analyze the Green computing Grid Framework.

To understand the issues related with Green compliance. To study and develop various case studies.

UNIT I FUNDAMENTALS 9

Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

UNIT II GREEN ASSETS AND MODELING 9

Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

UNIT III GRID FRAMEWORK 9

Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

UNIT IV GREEN COMPLIANCE 9

Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.

UNIT V CASE STUDIES 9

The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.

Enhance the skill in energy saving practices in their use of hardware.

Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders.

Understand the ways to minimize equipment disposal requirements .

TEXT BOOKS:

Bhuvan Unhelkar, “Green IT Strategies and Applications-Using Environmental Intelligence”, CRC Press, June 2014.

Woody Leonhard, Katherine Murray, “Green Home computing for dummies”, August 2012.

REFERENCES:

Alin Gales, Michael Schaefer, Mike Ebbers, “Green Data Center: steps for the Journey”, Shroff/IBM rebook, 2011.

John Lamb, “The Greening of IT”, Pearson Education, 2009.

Jason Harris, “Green Computing and Green IT- Best Practices on regulations & industry”, Lulu.com, 2008

Carl speshocky, “Empowering Green Initiatives with IT”, John Wiley & Sons, 2010.

Wu Chun Feng (editor), “Green computing: Large Scale energy efficiency”, CRC Press

CS8076 GPU ARCHITECTURE AND PROGRAMMING LTPC
3 003

OBJECTIVES:

To understand the basics of GPU architectures

To write programs for massively parallel processors

To understand the issues in mapping algorithms for GPUs

To introduce different GPU programming models

UNIT I GPU ARCHITECTURE 12

Evolution of GPU architectures - Understanding Parallelism with GPU –Typical GPU Architecture - CUDA Hardware Overview - Threads, Blocks, Grids, Warps, Scheduling - Memory Handling with CUDA: Shared Memory, Global Memory, Constant Memory and Texture Memory.

UNIT II CUDA PROGRAMMING 8

Using CUDA - Multi GPU - Multi GPU Solutions - Optimizing CUDA Applications: Problem Decomposition, Memory Considerations, Transfers, Thread Usage, Resource Contentions.

UNIT III PROGRAMMING ISSUES 8

Common Problems: CUDA Error Handling, Parallel Programming Issues, Synchronization, Algorithmic Issues, Finding and Avoiding Errors.

UNIT IV OPENCL BASICS 8

OpenCL Standard – Kernels – Host Device Interaction – Execution Environment – Memory Model – Basic OpenCL Examples.

UNIT V ALGORITHMS ON GPU 9

Parallel Patterns: Convolution, Prefix Sum, Sparse Matrix - Matrix Multiplication - Programming Heterogeneous Cluster.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

Describe GPU Architecture

Write programs using CUDA, identify issues and debug them

Implement efficient algorithms in GPUs for common application kernels, such as matrix multiplication

Write simple programs using OpenCL

Identify efficient parallel programming patterns to solve problems

TEXT BOOKS:

Shane Cook, CUDA Programming: —A Developer's Guide to Parallel Computing with GPUs (Applications of GPU Computing), First Edition, Morgan Kaufmann, 2012.

David R. Kaeli, Perhaad Mistry, Dana Schaa, Dong Ping Zhang, "Heterogeneous computing with OpenCL", 3rd Edition, Morgan Kauffman, 2015.

REFERENCES:

Nicholas Wilt, —CUDA Handbook: A Comprehensive Guide to GPU Programming, Addison - Wesley, 2013.

Jason Sanders, Edward Kandrot, —CUDA by Example: An Introduction to General Purpose GPU Programming**ll, Addison** - Wesley, 2010.

David B. Kirk, Wen-mei W. Hwu, Programming Massively Parallel Processors - A Hands-on Approach, Third Edition, Morgan Kaufmann, 2016.

http://www.nvidia.com/object/cuda_home_new.html

http://www.openCL.org

CS8084 NATURAL LANGUAGE PROCESSING LTPC 3003

OBJECTIVES:

To learn the fundamentals of natural language processing
To understand the use of CFG and PCFG in NLP
To understand the role of semantics of sentences and pragmatics To apply the NLP techniques to IR applications

UNIT I INTRODUCTION 9

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

UNIT II WORD LEVEL ANALYSIS 9

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT III SYNTACTIC ANALYSIS 9

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures.

UNIT IV SEMANTICS AND PRAGMATICS 10

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT V DISCOURSE ANALYSIS AND LEXICAL RESOURCES 8

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

To tag a given text with basic Language features

To design an innovative application using NLP components

To implement a rule based system to tackle morphology/syntax of a language

To design a tag set to be used for statistical processing for real-time applications To compare and contrast the use of different statistical approaches for different types of NLP applications.

TEXT BOOKS:

Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.

Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python**l, First Edition, O'Reilly Media, 2009.**

REFERENCES:

Breck Baldwin, —Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.

Richard M Reese, —Natural Language Processing with Javal**, O'Reilly Media, 2015.**

Nitin Indurkhya and **Fred J. Damerau, —Handbook** of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.

Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

CS8001	PARALLEL ALGORITHMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand different parallel architectures and models of computation.

To introduce the various classes of parallel algorithms.

To study parallel algorithms for basic problems.

UNIT I INTRODUCTION **9**

Need for Parallel Processing - Data and Temporal Parallelism - Models of Computation - RAM and PRAM Model – Shared Memory and Message Passing Models- Processor Organisations - PRAM Algorithm – Analysis of PRAM Algorithms- Parallel Programming Languages.

UNIT II PRAM ALGORITHMS **9**

Parallel Algorithms for Reduction – Prefix Sum – List Ranking –Preorder Tree Traversal – Searching -Sorting - Merging Two Sorted Lists – Matrix Multiplication - Graph Coloring - Graph Searching.

UNIT III SIMD ALGORITHMS -I **9**

2D Mesh SIMD Model - Parallel Algorithms for Reduction - Prefix Computation - Selection - Odd-Even Merge Sorting - Matrix Multiplication

UNIT IV SIMD ALGORITHMS -II **9**

Hypercube SIMD Model - Parallel Algorithms for Selection- Odd-Even Merge Sort- Bitonic Sort- Matrix Multiplication Shuffle Exchange SIMD Model - Parallel Algorithms for Reduction -Bitonic Merge Sort - Matrix Multiplication - Minimum Cost Spanning Tree

UNIT V MIMD ALGORITHMS **9**

UMA Multiprocessor Model -Parallel Summing on Multiprocessor- Matrix Multiplication on Multiprocessors and Multicomputer - Parallel Quick Sort - Mapping Data to Processors.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the students should be able to

Develop parallel algorithms for standard problems and applications. Analyse efficiency of different parallel algorithms.

TEXT BOOKS:

Michael J. Quinn, "Parallel Computing : Theory & Practice", Tata McGraw Hill Edition, Second edition, 2017.

Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", University press, Second edition , 2011.

V Rajaraman, C Siva Ram Murthy, " Parallel computers- Architecture and Programming ", PHI learning, 2016.

REFERENCES:

Ananth Grame, George Karpis, Vipin Kumar and Anshul Gupta, "Introduction to Parallel Computing", 2nd Edition, Addison Wesley, 2003.

M Sasikumar, Dinesh Shikhare and P Ravi Prakash , " Introduction to Parallel Processing", PHI learning , 2013.

S.G.Akl, "The Design and Analysis of Parallel Algorithms", PHI, 1989.

IT8077 **SPEECH PROCESSING** **L TPC 3003**

OBJECTIVES:

To understand the fundamentals of the speech processing Explore the various speech models

Gather knowledge about the phonetics and pronunciation processing Perform wavelet analysis of speech

To understand the concepts of speech recognition

UNIT I INTRODUCTION **9**

Introduction - knowledge in speech and language processing - ambiguity - models and algorithms language - thought - understanding - regular expression and automata - words & transducers – N grams

UNIT II SPEECH MODELLING **9**

Word classes and part of speech tagging – hidden markov model – computing likelihood: the forward algorithm – training hidden markov model – maximum entropy model – transformation-based tagging – evaluation and error analysis – issues in part of speech tagging – noisy channel model for spelling

UNIT III SPEECH PRONUNCIATION AND SIGNAL PROCESSING **9**

Phonetics - speech sounds and phonetic transcription - articulatory phonetics - phonological categories and pronunciation variation - acoustic phonetics and signals - phonetic resources - articulatory and gestural phonology

UNIT IV SPEECH IDENTIFICATION 9

Speech synthesis - text normalization - phonetic analysis - prosodic analysis – diphone waveform synthesis - unit selection waveform synthesis - evaluation

UNIT V SPEECH RECOGNITION 9

Automatic speech recognition - architecture - applying hidden markov model - feature extraction: mfcc vectors - computing acoustic likelihoods - search and decoding - embedded training - multipass decoding: n-best lists and lattices- a* ('stack') decoding - context-dependent acoustic models: triphones - discriminative training - speech recognition by humans

TOTAL : 45 PERIODS

OUTCOMES:

On Successful completion of the course ,Students will be able to

Create new algorithms with speech processing Derive new speech models

Perform various language phonetic analysis

Create a new speech identification system

Generate a new speech recognition system

TEXT BOOK:

Daniel Jurafsky and James H. Martin, " Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Person education,2013.

REFERENCES

Kai-Fu Lee, "Automatic Speech Recognition", The Springer International Series in Engineering and Computer Science, 1999.

Himanshu Chaurasiya, "Soft Computing Implementation of Automatic Speech Recognition", LAP Lambert Academic Publishing, 2010.

Claudio Becchetti, Klucio Prina Ricotti, "Speech Recognition: Theory and C++ implementation",Wiley publications 2008.

Ikrami Eldirawy , Wesam Ashour, "Visual Speech Recognition", Wiley publications , 2011

GE8073 FUNDAMENTALS OF NANOSCIENCE LT PC 3003

OBJECTIVES:

To learn about basis of nanomaterial science, preparation method, types and application

UNIT I INTRODUCTION 8

Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II GENERAL METHODS OF PREPARATION 9

Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III NANOMATERIALS 12

Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications-Nanometal oxides-ZnO, TiO2,MgO, ZrO2, NiO, nanoalumina, CaO, AgTiO2, Ferrites, Nanoclays-functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

UNIT IV CHARACTERIZATION TECHNIQUES 9

X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques-AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation.

UNIT V APPLICATIONS 7

NanoInfoTech: Information storage- nanocomputer, molecular switch, super chip, nanocrystal,

Nanobiotechlogy: nanoprobes in medical diagnostics and biotechnology, Nano medicines, Targetted drug delivery, Bioimaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nanosensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sunbarrier products - In Photostat, printing, solar cell, battery.

TOTAL: 45 PERIODS

OUTCOMES:

Will familiarize about the science of nanomaterials
Will demonstrate the preparation of nanomaterials
Will develop knowledge in characteristic nanomaterial

TEXT BOOKS :

A.S. Edelstein and R.C. Cammearata, eds., “Nanomaterials: Synthesis, Properties and Applications”, Institute of Physics Publishing, Bristol and Philadelphia, 1996.

N John Dinardo, “Nanoscale Charecterisation of surfaces & Interfaces”, 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000.

REFERENCES:

G Timp, “Nanotechnology”, AIP press/Springer, 1999.

Akhlesh Lakhtakia,“The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations”. Prentice-Hall of India (P) Ltd, New Delhi, 2007.

ANNAUNIVERSITY,CHENNAI

NON-AUTONOMOUS COLLEGES

AFFILIATED TO ANNA UNIVERSITY

REGULATIONS 2021

CHOICE BASED CREDIT SYSTEM

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULA AND SYLLABI FOR SEMESTER I & II

SEMESTER –I

S. NO.	COURSE	COURSE TITLE	CATE-	PERIODS PER			TOTAL CONTACT	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
THEORY								
2.	HS3151	Professional English - I	HSMC	3	1	0	4	4
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3		0	3	3
5.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
6.	GE3151	Problem Solving and Python Programming	ESC	3	0	0	3	3
PRACTICALS								
7.	GE3171	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
8.	BS3171	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
			TOTAL	15	2	8	25	21

SEMESTER –II

S. NO.	COURSE	COURSE TITLE	CATE-	PERIODS PER			TOTAL CONTACT	CREDITS
				L	T	P		
THEORY								
1.	HS3251	Professional English - II	HSMC	3	1	0	4	4
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	PH3202	Physics for Electrical Engineering	BSC	3	0	0	3	3
4.	BE3255	Basic Civil and Mechanical	ESC	3	0		3	3
5.	GE3251	Engineering Graphics	ESC	2	0	4	6	4
6.	EE3251	Electric Circuit Analysis	PCC	3	1	0	4	4
7.		NCC Credit Course	-	2	0	0	2	2
PRACTICALS								
8.	GE3271	Engineering Practices Laboratory	ESC	0	0	4	4	2
9.	EE3271	Electric Circuits Lab	PCC	0	0	4	4	2
			TOTAL	17	3	12	32	26

IP3151 INDUCTION PROGRAMME

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc. (ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it everyday for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human

Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.

Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so

on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References
:
Guide to Induction program from
AICTE

HS3151	PROFESSIONAL ENGLISH - I	L	T	P	C
		3	1	0	4

OBJECTIVES :

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
- To use language efficiently in expressing their opinions via various media.

INTRODUCTION TO EFFECTIVE COMMUNICATION 1
What is effective communication? (There are many interesting activities for this.)
Why is communication critical for excellence during study, research and work?
What are the seven C's of effective communication?
What are key language skills?
What is effective listening? What does it involve?
What is effective speaking?
What does it mean to be an excellent reader? What should you be able to do?
What is effective writing?
How does one develop language and communication skills?
What does the course focus on? How are communication and language skills going to be enhanced
during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

UNIT I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 11
Listening –for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form
Speaking - Self Introduction; Introducing a friend; Conversation - politeness strategies; Telephone conversation; Leave a voicemail; Leave a message with another person; asking for information to fill
details in a
form.
Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails.

Writing - Writing emails / letters introducing oneself
Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags
Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II NARRATION AND SUMMATION 12

Listening - Listening to podcast, anecdotes / stories / event narration; documentaries and interviews with celebrities.
Speaking - Narrating personal experiences / events; Interviewing a celebrity; Reporting / and summarising of documentaries / podcasts/ interviews.
Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs.
Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions
Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

UNIT III DESCRIPTION OF A PROCESS / PRODUCT 12

Listening - Listen to a product and process descriptions; a classroom lecture;and advertisements about a products.
Speaking – Picture description; Giving instruction to use the product; Presenting a product; and Summarising a lecture.
Reading – Reading advertisements, gadget reviews; user manuals.
Writing - Writing definitions; instructions; and Product /Process description.
Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers(connectives & sequence words)

UNIT IV CLASSIFICATION ND RECOMMENDATIONS 12

Listening – Listening to TED Talks; Scientific lectures; and educational videos. Speaking – Small Talk; Mini presentations and making recommendations.
Reading – Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc,.)
Writing – Note-making / Note-taking (*Study skills to be taught, not tested); ; Writing recommendations; Transferring information from non verbal (chart , graph etc, to verbal mode)
Grammar – Articles; Pronouns - Possessive & Relative

pronouns. Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT V EXPRESSION 12

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking –group discussions, Debates, and Expressing opinions through Simulations & Roleplay. Reading – Reading editorials; and Opinion Blogs;
Writing – Essay Writing (Descriptive or narrative).
Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound
& Complex Sentences.
Vocabulary - Cause & Effect Expressions – Content vs Function words.

TOTAL : 60 PERIODS

OUTCOMES :

At the end of the course, learners will be able

- To listen and comprehend complex academic texts
- To read and infer the denotative and connotative meanings of technical texts
- To write definitions, descriptions, narrations and essays on various topics
- To speak fluently and accurately in formal and informal communicative contexts
- To express their opinions effectively in both oral and written medium of communication

TEXT BOOKS :

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Technical Communication – Principles And Practices, Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book On Technical English By Lakshminarayanan, Scitech Publications Pvt. Ltd.
3. English For Technical Communication (With CD) By Aysha Viswamohan, Hill Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New

MA3151	MATRICES AND CALCULUS	L	T	P	C
		3	1	0	4

OBJECTIVES :

- To develop the use of matrix algebra techniques that is needed by engineers for

practical applications.

- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I MATRICES 9 + 3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications : Stretching of an elastic membrane.

UNIT II DIFFERENTIAL CALCULUS 9 + 3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications : Maxima and Minima of functions of one variable.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9 + 3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV INTEGRAL CALCULUS 9 + 3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration : Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications : Hydrostatic force and pressure, moments and centres of mass.

NIT V MULTIPLE INTEGRALS 9 + 3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications : Moments and centres of mass, moment of inertia.

OUTCOMES :

At the end of the course the students will be able to

- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Able to use differential calculus ideas on several variable

functions.

- Apply different methods of integration in solving practical problems.

TOTAL : 60 PERIODS

- Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS :

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition , 2018.
3. James Stewart, " Calculus : Early Transcendentals ", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :

1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
2. Bali. N., Goyal. M. and Watkins. C., " Advanced Engineering Mathematics ", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7th Edition, 2009.
3. Jain . R.K. and Iyengar. S.R.K., " Advanced Engineering Mathematics ", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan. S. and Manicavachagom Pillai. T. K., " Calculus " Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., " Higher Engineering Mathematics ", McGraw Hill Education Pvt. Ltd,New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, " Engineering Mathematics " Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, " Thomas Calculus ", 14th Edition, Pearson India, 2018.

PH3151 ENGINEERING PHYSICS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to be successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT I MECHANICS 9

Multiparticle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

UNIT II ELECTROMAGNETIC WAVES 9

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS 9

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems
- waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference –
Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics -
Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser,
CO_2 laser, semiconductor laser –Basic applications of lasers in industry.

UNIT IV BASIC QUANTUM MECHANICS 9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.

UNIT V APPLIED QUANTUM MECHANICS 9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

TOTAL : 45 PERIODS

OUTCOMES:

After completion of this course, the students should be able to

- Understand the importance of mechanics.
- Express their knowledge in electromagnetic waves.
- Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
- Understand the importance of quantum physics.
- Comprehend and apply quantum mechanical principles towards the formation of energy bands.

TEXT BOOKS:

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw-Hill (Indian Edition), 2017.

REFERENCES:

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer- Verlag, 2012.

CY3151	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

UNIT I WATER AND ITS TREATMENT 9

Water: Sources and impurities, Water quality parameters: Definition and significance of-colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralisation and zeolite process.

UNIT II NANOCHEMISTRY 9

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT III PHASE RULE AND COMPOSITES 9

Phase rule:Introduction, definition of terms with examples. One component system - water system;
Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process.
Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel:
Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; Power alcohol and biodiesel.
Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition

temperature, Explosive range; Flue gas analysis - ORSAT Method. CO_2 emission and carbon foot print.

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy;Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion- battery; Electric vehicles-working principles; Fuel cells: H_2-O_2 fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students will be able:

- To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
- To apply the knowledge of phase rule and composites for material selection requirements.
- To recommend suitable fuels for engineering processes and applications.
- To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications",

Cambridge
University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and
Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

GE3151 PROBLEM SOLVING AND PYTHON PROGRAMMING L T P C
3 0 0

OBJECTIVES:

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING 9

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition,

recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs:
square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems. CO2: Develop and execute simple Python programs.

CO3: Write simple Python programs using conditionals and looping for solving problems.

CO4: Decompose a Python program into functions.

CO5: Represent compound data using Python lists, tuples, dictionaries etc. CO6: Read and write data from/to files in Python programs.

TEXT BOOKS:

1. Allen B. Downey, "Think Python : How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python:

With
Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press ,
2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to
Programming", 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

HS3251 PROFESSIONAL ENGLISH - II L T P C

3 1 0 4

OBJECTIVES :

- To engage learners in meaningful language activities to improve their LSRW skills
- To enhance learners' awareness of general rules of writing for specific audiences
- To help learners understand the purpose, audience, contexts of different types of writing
- To develop analytical thinking skills for problem solving in communicative contexts
- To demonstrate an understanding of job applications and interviews for internship and placements

UNIT I MAKING COMPARISONS 12

Listening – Evaluative Listening: Advertisements, Product Descriptions, -Audio / video; Listening and filling a Graphic Organiser (Choosing a product or service by comparison)
Speaking – Marketing a product, Persuasive Speech
Techniques. Reading - Reading advertisements, user manuals, brochures;
Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed
Tenses, Prepositional phrases
Vocabulary – Contextual meaning of words

UNIT II EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING 12

Listening - Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects - Speaking – Describing and discussing the reasons of accidents or disasters based on news reports. Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint, Writing - Writing responses to complaints.
Grammar - Active Passive Voice transformations, Infinitive and Gerunds Vocabulary – Word
Formation (Noun-Verb-Adj-Adv), Adverbs.

UNIT III PROBLEM SOLVING 12

Listening – Listening to / Watching movie scenes/ documentaries depicting a technical problem and suggesting solutions.
Speaking – Group Discussion(based on case studies), - techniques and Strategies, Reading - Case Studies, excerpts from literary texts, news reports etc.,
Writing – Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay
Grammar -– Errorcorrection; If conditional sentences
Vocabulary - Compound Words, Sentence Completion.

UNIT IV REPORTING OF EVENTS AND RESEARCH 12

Listening – Listening Comprehension based on news reports – and documentaries – Precise writing, Summarising, Speaking –Interviewing, Presenting an oral report, Mini presentations on select topics; Reading –Newspaper articles; Writing – Recommendations, Transcoding, Accident Report, Survey Report Grammar – Reported Speech, Modals Vocabulary – Conjunctions- use of prepositions

UNIT V THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY 12

Listening – Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance);
Speaking – Participating in a Role play, (interview/telephone interview), virtual interviews, Making presentations with visual aids;
Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses Vocabulary – Idioms.

TOTAL : 60 PERIODS

OUTCOMES:

At the end of the course, learners will be able

- To compare and contrast products and ideas intechnical texts.

- To identify cause and effects in events, industrial processes through technical texts
- To analyse problems in order to arrive at feasible solutions and communicate them orally and in the written format.
- To report events and the processes of technical and industrial nature.
- To present their opinions in a planned and logical manner, and draft effective resumes in context of job search.

TEXT BOOKS :

1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd.
   Department of English, Anna University.
2. English for Science & Technology Cambridge University Press 2021.
   Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press.
   New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, NewDelhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata
   McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd.
   1990, Delhi.

MA3251	STATISTICS AND NUMERICAL METHODS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS

9 + 3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS

9 + 3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS

9 + 3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION

9 +3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical
single and double integrations using Trapezoidal and Simpson's 1/3
rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

9 +3

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to:

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.
- Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.

- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., " Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

PH3202 PHYSICS FOR ELECTRICAL ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To make the students to understand the basics of dielectric materials and insulation.
- To understand the electrical properties of materials including free electron theory, applications of quantum mechanics and magnetic materials.
- To instil knowledge on physics of semiconductors, determination of charge carriers and device applications
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications
- To inculcate an idea of significance of nano structures, quantum confinement and ensuing nano device applications.

UNIT I DIELECTRIC MATERIALS AND INSULATION

9

Matter polarization and relative permittivity: definition – dipole moment and polarization vector P- polarization mechanisms: electronic, ionic, orientational, interfacial and total polarization – frequency dependence – local field and Causius-Mossetti equation – dielectric constant and dielectric loss – Gauss's law and boundary conditions – dielectric strength, introduction to insulation breakdown in gases, liquids and solids – capacitor materials – typical capacitor constructions – piezoelectricity, ferroelectricity and pyroelectricity – quartz oscillators and filters – piezo and pyroelectric crystals.

UNIT II ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Quantum free electron theory :Tunneling – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole. Magnetic materials: Dia, para and ferromagnetic effects – paramagnetism in the conduction electrons in metals – exchange interaction and ferromagnetism – quantum interference devices – GMR devices.

UNIT III SEMICONDUCTORS AND TRANSPORT PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain. Optical processes in quantum wells – Optoelectronic devices: light detectors and solar cells – light emitting diode – laser diode - optical processes in organic semiconductor devices –excitonic state – Electro-optics and nonlinear optics: Modulators and switching devices – plasmonics.

UNIT V NANO DEVICES 9

Density of states for solids - Significance between Fermi energy and volume of the material – Quantum confinement – Quantum structures – Density of states for quantum wells, wires and dots – Band gap of nanomaterials –Tunneling – Single electron phenomena – Single electron Transistor. Conductivity of metallic nanowires – Ballistic transport – Quantum resistance and conductance –

Carbon nanotubes: Properties and applications - Spintronic devices and applications – Optics in quantum structures – quantum well laser.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able to

- know basics of dielectric materials and insulation.

- gain knowledge on the electrical and magnetic properties of materials and their applications
- understand clearly of semiconductor physics and functioning of semiconductor devices
- understand the optical properties of materials and working principles of various optical devices
- appreciate the importance of nanotechnology and nanodevices.

TEXT BOOKS:

1. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.
2. R.F.Pierret. Semiconductor Device Fundamentals. Pearson (Indian Edition), 2006.
3. G.W.Hanson. Fundamentals of Nanoelectronics. Pearson Education (Indian Edition), 2009.

REFERENCES:

1. .Laszlo Solymar, Walsh, Donald, Syms and Richard R.A., Electrical Properties of Materials, Oxford Univ. Press (Indian Edition) 2015.
2. Jasprit Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw- Hill Education (Indian Edition), 2019.
3. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
4. Mark Fox, Optical Properties of Solids, Oxford Univ.Press, 2001.
5. Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-Hill Education (Indian Edition), 2020.

BE3255 BASIC CIVIL AND MECHANICAL ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To provide the students an illustration of the significance of the Civil and Mechanical Engineering Profession in satisfying the societal needs.
- To help students acquire knowledge in the basics of surveying and the materials used for construction.
- To provide an insight to the essentials of components of a building and the infrastructure facilities.
- To explain the component of power plant units and detailed explanation to IC engines their working principles.
- To explain the Refrigeration & Air-conditioning system.

UNIT I PART A: OVERVIEW OF CIVIL ENGINEERING 5

Civil Engineering contributions to the welfare of Society - Specialized sub disciplines

in Civil
Engineering – Structural, Construction, Geotechnical, Environmental, Transportation and Water

Resources Engineering – National building code – terminologists: Plinth area, Carpet area, Floor area, Buildup area, Floor space index - Types of buildings: Residential buildings, Industrial buildings.

UNIT I PART B: OVERVIEW OF MECHANICAL ENGINEERING 4

Overview of Mechanical Engineering - Mechanical Engineering Contributions to the welfare of Society –Specialized sub disciplines in Mechanical Engineering – Manufacturing, Automation, Automobile and Energy Engineering - Interdisciplinary concepts in Mechanical Engineering.

UNIT II SURVEYING AND CIVIL ENGINEERING MATERIALS 9

Surveying: Objects – Classification – Principles – Measurements of Distances and angles –
Leveling – Determination of areas–
Contours.
Civil Engineering Materials: Bricks – Stones – Sand – Cement – Concrete – Steel - Timber - Modern
Materials, Thermal and Acoustic Insulating Materials, Decorative Panels, Water Proofing Materials. Modern uses of Gypsum, Pre-fabricated Building component (brief discussion only)

UNIT III BUILDING COMPONENTS AND INFRASTRUCTURE 9

Building plans – Setting out of a Building - Foundations: Types of foundations - Bearing capacity and settlement – Brick masonry – Stone Masonry – Beams – Columns – Lintels – Roofing – Flooring – Plastering.
Types of Bridges and Dams – Water Supply Network - Rain Water Harvesting – Solid Waste
Management - Introduction to Highways and Railways - Introduction to Green Buildings.

UNIT IV INTERNAL COMBUSTION ENGINES AND POWER PLANTS 9

Classification of Power Plants- Working principle of steam, Gas, Diesel, Hydro -electric and Nuclear Power plants- Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines. Working principle of Boilers-Turbines, Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps, Concept of hybrid engines. Industrial safety practices and protective devices

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 9

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system–Layout of typical domestic refrigerator–Window and Split type room Air conditioner. Properties of air - water mixture, concepts of psychometric and its process.

TOTAL: 45 PERIODS

OUTCOMES:

CO1: Understanding profession of Civil and Mechanical engineering.
CO2: Summarise the planning of building, infrastructure and working of Machineries. CO3: Apply the knowledge gained in respective discipline
CO4: Illustrate the ideas of Civil and Mechanical Engineering applications.
CO5: Appraise the material, Structures, machines and energy.

TEXT BOOKS:

1. G Shanmugam, M S Palanichamy, Basic Civil and Mechanical Engineering, McGraw Hill Education; First edition, 2018

REFERENCES:

1. Palanikumar, K. Basic Mechanical Engineering, ARS Publications, 2018.
2. Ramamrutham S., "Basic Civil Engineering", Dhanpat Rai Publishing Co.(P) Ltd, 2013.
3. Seetharaman S., "Basic Civil Engineering", Anuradha Agencies, 2005.
4. Shantha Kumar SRJ., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, 2000
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GE3251 ENGINEERING GRAPHICS

L	T	P	C
2	0	4	4

OBJECTIVES:

The main learning objective of this course is to prepare the students for:

1. Drawing engineering curves.
2. Drawing freehand sketch of simple objects.
3. Drawing orthographic projection of solids and section of solids.
4. Drawing development of solids
5. Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications — Use of drafting instruments — BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING

6+12

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 6+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.

Practicing three dimensional modeling of simple objects by CAD Software(Not for examination)

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6 +12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.

Practicing three dimensional modeling of simple objects by CAD Software(Not for examination)

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12

Principles of isometric projection — isometric scale —Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

Practicing three dimensional modeling of isometric projection of simple objects by CAD Software(Not for examination)

TOTAL: (L=30+P=60) 90 PERIODS

OUTCOMES
:

On successful completion of this course, the student will be able to

- Use BIS conventions and specifications for engineering drawing.
- Construct the conic curves, involutes and cycloid.
- Solve practical problems involving projection of lines.
- Draw the orthographic, isometric and perspective projections of simple solids.
- Draw the development of simple solids.

TEXT BOOK:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

REFERENCES:

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition,2017.
3. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
6. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

Publication of Bureau of Indian Standards:

1. IS 10711 — 2001: Technical products Documentation — Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) — 2001: Technical products Documentation — Lettering.
3. IS 10714 (Part 20) — 2001 & SP 46 — 2003: Lines for technical drawings.
4. IS 11669 — 1986 & SP 46 —2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) — 2001: Technical drawings — Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

EE3251 ELECTRIC CIRCUIT ANALYSIS L T P C
3 1 0 4

OBJECTIVES:

- To introduce electric circuits and its analysis
- To provide key concepts to analyze and understand electrical circuits
- To impart knowledge on solving circuit equations using network theorems
- To educate on obtaining the transient response of circuits.
- To introduce the phenomenon of resonance in coupled circuits.
- To introduce Phasor diagrams and analysis of single &three phase circuits

UNIT I BASIC CIRCUITS ANALYSIS 9+3

Fundamentals concepts of R, L and C elements-Energy Sources- Ohm's Law -Kirchhoff 's Laws – DC Circuits – Resistors in series and parallel circuits - A.C Circuits – Average and RMS Value – Complex Impedance – Phasor diagram - Real and Reactive Power, Power Factor, Energy -Mesh current and node voltage methods of analysis D.C and A.C Circuits.

UNIT II NETWORK REDUCTION AND THEOREMS FOR DC AND AC CIRCUITS 9+3

Network reduction: voltage and current division, source transformation – star delta conversion. Theorems – Superposition, Thevenin's and Norton's Theorem – Maximum power transfer theorem – Reciprocity Theorem – Millman's theorem- Tellegen's Theorem-Statement, application to DC and AC Circuits.

UNIT III TRANSIENT RESPONSE ANALYSIS 9+3

Introduction – Laplace transforms and inverse Laplace transforms- standard test signals - Transient response of RL, RC and RLC circuits using Laplace transform for Source free, Step input and Sinusoidal input.

UNIT IV RESONANCE AND COUPLED CIRCUITS 9+3

Series and parallel resonance –frequency response – Quality factor and Bandwidth – Self and mutual inductance – Coefficient of coupling – Dot rule-Analysis of coupled circuits– Single Tuned circuits..

UNIT V THREE PHASE CIRCUITS 9+3

Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced and unbalanced – phasor diagram of voltages and currents – power measurement in three phase circuits– Power Factor Calculations.

TOTAL: 60 PERIODS

OUTCOMES:

After completing this course, the students will be able to: CO1: Explain circuit's behavior using circuit laws.

CO2: Apply mesh analysis/ nodal analysis / network theorems to determine behavior of the given
DC and AC circuit
CO3: Compute the transient response of first order and second order systems to step and sinusoidal input
CO4: Compute power, line/ phase voltage and currents of the given three phase circuit
CO5: Explain the frequency response of series and parallel RLC circuits
CO6: Explain the behavior of magnetically coupled circuits.

TEXT BOOKS:

1. William H. HaytJr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill publishers, 9th edition, New Delhi, 2020.
2. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2019.
3. Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning India, 2013.

REFERENCES

1. Chakrabarti A, "Circuits Theory (Analysis and synthesis), Dhanpat Rai& Sons, New Delhi, 2020.
2 Joseph A. Edminister, Mahmood Nahvi, "Electric circuits", Schaum's series, McGraw-Hill, First Edition, 2019.
4. M E Van Valkenburg, "Network Analysis",Prentice-Hall of India Pvt Ltd, New Delhi, 2015.
5. Richard C. Dorf and James A. Svoboda, "Introduction to Electric Circuits", 7th Edition, John Wiley & Sons, Inc. 2018.
6. Sudhakar A and Shyam Mohan SP, "Circuits and Networks Analysis and Synthesis", McGraw Hill, 2015.

ANNA UNIVERSITY, CHENNAI
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B.E. ELECTRICAL AND ELECTRONICS ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM

Educational Objectives

Bachelor of Electrical and Electronics Engineering curriculum is designed to prepare the graduates having attitude and knowledge to

Have successful technical and professional careers in their chosen fields such as circuit theory, Field theory, control theory and computational platforms.

Engross in life long process of learning to keep themselves abreast of new developments in the field of Electronics and their applications in power engineering.

Apply the Mathematical knowledge and the basics of Science and Engineering to solve the problems pertaining to Electronics and Instrumentation Engineering.

Identify and formulate Electrical and Electronics Engineering problems from research literature and be ability to analyze the problem using first principles of Mathematics and Engineering Sciences.

Come out with solutions for the complex problems and to design system components or process that fulfill the particular needs taking into account public health and safety and the social, cultural and environmental issues.

Draw well-founded conclusions applying the knowledge acquired from research and research methods including design of experiments, analysis and interpretation of data and synthesis of information and to arrive at significant conclusion.

Form, select and apply relevant techniques, resources and Engineering and IT tools for Engineering activities like electronic prototyping, modeling and control of systems and also being conscious of the limitations.

Understand the role and responsibility of the Professional Electrical and Electronics Engineer and to assess societal, health, safety issues based on the reasoning received from the contextual knowledge.

Be aware of the impact of professional Engineering solutions in societal and environmental contexts and exhibit the knowledge and the need for Sustainable Development.

Apply the principles of Professional Ethics to adhere to the norms of the engineering practice and to discharge ethical responsibilities.

Function actively and efficiently as an individual or a member/leader of different teams and multidisciplinary projects.

Communicate efficiently the engineering facts with a wide range of engineering community and others, to understand and prepare reports and design documents; to make effective presentations and to frame and follow instructions.

Demonstrate the acquisition of the body of engineering knowledge and insight and Management Principles and to apply them as member / leader in teams and multidisciplinary environments.

Recognize the need for self and life-long learning, keeping pace with technological challenges in the broadest sense.

PEO \PO	a	b	c	d	e	f	g	h	i	j	k	l
1												
2												

SEMESTER	NAME OF THE SUBJECT	PROGRAM OUTCOMES											
		a	b	c	d	e	f	g	h	i	j	k	l
	THEORY												
SEM I	Communicative English												
	Engineering Mathematics - I												
	Engineering Physics												
	Engineering Chemistry												
	Problem Solving and Python Programming												
	Engineering Graphics												
	PRACTICAL												
	Problem Solving and Python Programming Laboratory												
	Physics and Chemistry Laboratory												
	THEORY												
SEM II	Technical English												
	Engineering Mathematics - II												
	Physics For Electronics Engineering												
	Basic Civil and Mechanical Engineering												
	Circuit Theory												
	Environmental Science and Engineering												
	PRACTICALS												
	Engineering Practices Laboratory												
	Electric Circuits Lab												
	THEORY												
SEM III	Transforms and Partial Differential Equations												
	Digital Logic Circuits												
	Electromagnetic Theory												
	Electrical Machines – I												

	Electron Devices and Circuits												
	Power Plant Engineering												
	PRACTICALS												
	Electronics Laboratory												
	Electrical Machines Laboratory - I												
	THEORY												
SEM IV	**Numerical Methods**												
	Electrical Machines – II												
	Transmission and Distribution												
	Measurements and Instrumentation												
	Linear Integrated Circuits and Applications												
	Control Systems												
	PRACTICALS												
	Electrical Machines Lab II												
	Linear and Digital Integrated Circuits Laboratory												
	Technical Seminar												
	THEORY												
SEM V	**Power System Analysis**												
	Microprocessors and Microcontrollers												
	Power Electronics												
	Digital Signal Processing												
	Object Oriented Programming												
	Open Elective I												
	PRACTICALS												
	Control and Instrumentation Laboratory												

	Professional Communication												
	Object Oriented Programming Laboratory												
	THEORY												
SEM VI	**Solid State Drives**												
	Protection and Switchgear												
	Embedded Systems												
	Professional Elective I												
	Professional Elective II												
	PRACTICALS												
	Power Electronics and Drives Laboratory												
	Microprocessors and Microcontrollers Laboratory												
	Mini Project												
	THEORY												
SEM VII	**High Voltage Engineering**												
	Power System Operation and Control												
	Renewable Energy Systems												
	Open Elective II												
	Professional Elective III												
	Professional Elective IV												
	PRACTICALS												
	Power System Simulation Laboratory												
	Renewable Energy Systems Laboratory												
SEM VIII	**THEORY**												
	Professional Elective V												

	Professional Elective VI												
	PRACTICALS												
	Project Work												

. PROFESSIONAL ELECTIVE

SL.NO.	**NAME OF THE SUBJECT**	**PROGRAM OUTCOMES**											
		a	**b**	**c**	**d**	**e**	f	**g**	**h**	i	j	**k**	l
	THEORY												
ELECTIVE – I	**Advanced Control System**												
	Visual Languages and Applications												
	Design of Electrical Apparatus												
	Power Systems Stability												
	Modern Power Converters												
	Intellectual Property Rights												
ELECTIVE – II	**Principles of Robotics**												
	Special Electrical Machines												
	Power Quality												
	EHVAC Transmission												
	Communication Engineering												
ELECTIVE – III	**Disaster Management**												
	Human Rights												
	Operations Research												
	Probability and Statistics												
	Fibre Optics and Laser Instrumentation												
	Foundation Skills in Integrated Product Development												

ELECTIVE – IV	System Identification and Adaptive Control												
	Computer Architecture												
	Control of Electrical Drives												
	VLSI Design												
	Power Systems Transients												
	Total Quality Management												
ELECTIVE – V	Flexible AC Transmission Systems												
	Soft Computing Techniques												
	Power Systems Dynamics												
	SMPS and UPS												
	Electric Energy Generation, Utilization and Conservation												
	Professional Ethics in Engineering												
	Principals of Management												
ELECTIVE – VI	Energy Management and Auditing												
	Data Structures												
	High Voltage Direct Current Transmission												
	Microcontroller Based System Design												
	Smart Grid												
	Biomedical Instrumentation												
	Fundamentals of Nano Science												

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I TO VIII SEMESTERS CURRICULA & SYLLABI

SEMESTER I

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	MA8151	Engineering Mathematics - I	BS	4	4	0	0	4
3.	PH8151	Engineering Physics	BS	3	3	0	0	3
4.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
6.	GE8152	Engineering Graphics	ES	6	2	0	4	4
PRACTICALS								
7.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
8.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
			TOTAL	31	19	0	12	25

SEMESTER II

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8251	Technical English	HS	4	4	0	0	4
2.	MA8251	Engineering Mathematics - II	BS	4	4	0	0	4
3.	PH8253	Physics for Electronics Engineering	BS	3	3	0	0	3
4.	BE8252	Basic Civil and Mechanical Engineering	ES	4	4	0	0	4
5.	EE8251	Circuit Theory	PC	4	2	2	0	3
6.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
PRACTICALS								
7.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
8.	EE8261	Electric Circuits Laboratory	PC	4	0	0	4	2
			TOTAL	30	20	2	8	25

SEMESTER III

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
2.	EE8351	Digital Logic Circuits	PC	4	2	2	0	3
3.	EE8391	Electromagnetic Theory	PC	4	2	2	0	3
4.	EE8301	Electrical Machines - I	PC	4	2	2	0	3
5.	EC8353	Electron Devices and Circuits	ES	3	3	0	0	3
6.	ME8792	Power Plant Engineering	ES	3	3	0	0	3
PRACTICALS								
7.	EC8311	Electronics Laboratory	ES	4	0	0	4	2
8.	EE8311	Electrical Machines Laboratory - I	PC	4	0	0	4	2
			TOTAL	30	16	6	8	23

SEMESTER IV

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8491	Numerical Methods	BS	4	4	0	0	4
2.	EE8401	Electrical Machines - II	PC	4	2	2	0	3
3.	EE8402	Transmission and Distribution	PC	3	3	0	0	3
4.	EE8403	Measurements and Instrumentation	PC	3	3	0	0	3
5.	EE8451	Linear Integrated Circuits and Applications	PC	3	3	0	0	3
6.	IC8451	Control Systems	PC	5	3	2	0	4
PRACTICALS								
7.	EE8411	Electrical Machines Laboratory - II	PC	4	0	0	4	2
8.	EE8461	Linear and Digital Integrated Circuits Laboratory	PC	4	0	0	4	2
9.	EE8412	Technical Seminar	EEC	2	0	0	2	1
			TOTAL	32	18	4	10	25

SEMESTER V

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EE8501	Power System Analysis	PC	3	3	0	0	3
2.	EE8551	Microprocessors and Microcontrollers	PC	3	3	0	0	3
3.	EE8552	Power Electronics	PC	3	3	0	0	3
4.	EE8591	Digital Signal Processing	PC	4	2	2	0	3
5.	CS8392	Object Oriented Programming	ES	3	3	0	0	3
6.		Open Elective I*	OE	3	3	0	0	3
PRACTICALS								
7.	EE8511	Control and Instrumentation Laboratory	PC	4	0	0	4	2
8.	HS8581	Professional Communication	EEC	2	0	0	2	1
9.	CS8383	Object Oriented Programming Laboratory	ES	4	0	0	4	2
			TOTAL	29	17	2	10	23

SEMESTER VI

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EE8601	Solid State Drives	PC	3	3	0	0	3
2.	EE8602	Protection and Switchgear	PC	3	3	0	0	3
3.	EE8691	Embedded Systems	ES	3	3	0	0	3
4.		Professional Elective I	PE	3	3	0	0	3
5.		Professional Elective II	PE	3	3	0	0	3
PRACTICALS								
6.	EE8661	Power Electronics and Drives Laboratory	PC	4	0	0	4	2
7.	EE8681	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
8.	EE8611	Mini Project	EEC	4	0	0	4	2
			TOTAL	27	15	0	12	21

SEMESTER VII

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EE8701	High Voltage Engineering	PC	3	3	0	0	3
2.	EE8702	Power System Operation and Control	PC	3	3	0	0	3
3.	EE8703	Renewable Energy Systems	PC	3	3	0	0	3
4.		Open Elective II*	OE	3	3	0	0	3
5.		Professional Elective III	PE	3	3	0	0	3
6.		Professional Elective IV	PE	3	3	0	0	3
PRACTICALS								
7.	EE8711	Power System Simulation Laboratory	PC	4	0	0	4	2
8.	EE8712	Renewable Energy Systems Laboratory	PC	4	0	0	4	2
			TOTAL	26	18	0	8	22

SEMESTER VIII

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Professional Elective V	PE	3	3	0	0	3
2.		Professional Elective VI	PE	3	3	0	0	3
PRACTICALS								
3.	EE8811	Project Work	EEC	20	0	0	20	10
			TOTAL	26	6	0	20	16

TOTAL NO. OF CREDITS: 180

***Course from the curriculum of other UG Programmes.**

PROFESSIONAL ELECTIVE –I (VI SEMESTER)

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	IC8651	Advanced Control System	PE	4	2	2	0	3
2.	EE8001	Visual Languages and Applications	PE	3	3	0	0	3
3.	EE8002	Design of Electrical Apparatus	PE	3	3	0	0	3
4.	EE8003	Power Systems Stability	PE	3	3	0	0	3
5.	EE8004	Modern Power Converters	PE	3	3	0	0	3
6.	GE8075	Intellectual Property Rights	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – II (VI SEMESTER)

1.	RO8591	Principles of Robotics	PE	3	3	0	0	3
2.	EE8005	Special Electrical Machines	PE	3	3	0	0	3
3.	EE8006	Power Quality	PE	3	3	0	0	3
4.	EE8007	EHVAC Transmission	PE	3	3	0	0	3
5.	EC8395	Communication Engineering	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – III (VII SEMESTER)

1.	GE8071	Disaster Management	PE	3	3	0	0	3
2.	GE8074	Human Rights	PE	3	3	0	0	3
3.	MG8491	Operations Research	PE	3	3	0	0	3
4.	MA8391	Probability and Statistics	PE	4	4	0	0	4
5.	EI8075	Fibre Optics and Laser Instrumentation	PE	3	3	0	0	3
6.	GE8072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – IV (VII SEMESTER)

1.	EE8008	System Identification and Adaptive Control	PE	3	3	0	0	3
2.	CS8491	Computer Architecture	PE	3	3	0	0	3
3.	EE8009	Control of Electrical Drives	PE	3	3	0	0	3
4.	EC8095	VLSI Design	PE	3	3	0	0	3
5.	EE8010	Power Systems Transients	PE	3	3	0	0	3
6.	GE8077	Total Quality Management	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – V (VIII SEMESTER)

1.	EE8011	Flexible AC Transmission Systems	PE	3	3	0	0	3
2.	EE8012	Soft Computing Techniques	PE	3	3	0	0	3
3.	EE8013	Power Systems Dynamics	PE	3	3	0	0	3
4.	EE8014	SMPS and UPS	PE	3	3	0	0	3
5.	EE8015	Electric Energy Generation, Utilization and Conservation	PE	3	3	0	0	3
6.	GE8076	Professional Ethics in Engineering	PE	3	3	0	0	3
7.	MG8591	Principles of Management	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – VI (VIII SEMESTER)

1.	EE8016	Energy Management and Auditing	PE	3	3	0	0	3
2.	CS8391	Data Structures	PE	3	3	0	0	3
3.	EE8017	High Voltage Direct Current Transmission	PE	3	3	0	0	3
4.	EE8018	Microcontroller Based System Design	PE	3	3	0	0	3
5.	EE8019	Smart Grid	PE	3	3	0	0	3
6.	EI8073	Biomedical Instrumentation	PE	3	3	0	0	3
7.	GE8073	Fundamentals of Nanoscience	PE	3	3	0	0	3

***Professional Electives are grouped according to elective number as was done previously.**

HUMANITIES AND SOCIALSCIENCES (HS)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	HS8251	Technical English	HS	4	4	0	0	4
3.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3

BASIC SCIENCES (BS)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA8151	Engineering Mathematics I	BS	4	4	0	0	4
2.	PH8151	Engineering Physics	BS	3	3	0	0	3
3.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
4.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
5.	MA8251	Engineering Mathematics II	BS	4	4	0	0	4
6.	PH8253	Physics For Electronics Engineering	BS	3	3	0	0	3
7.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
8.	MA8491	Numerical Methods	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	GE8151	Problem Solving and Python programming	ES	3	3	0	0	3
2.	GE8152	Engineering Graphics	ES	6	2	0	4	4
3.	GE8161	Problem Solving and	ES		0	0	4	2

		Python programming Laboratory		4				
4.	BE8252	Basic Civil and Mechanical Engineering	ES	4	4	0	0	4
5.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
6.	EC8353	Electron Devices and Circuits	ES	3	3	0	0	3
7.	ME8792	Power Plant Engineering	ES	3	3	0	0	3
8.	EC8311	Electronics Laboratory	ES	4	0	0	4	2
9.	CS8392	Object Oriented Programming	ES	3	3	0	0	3
10.	CS8383	Object Oriented Programming Laboratory	ES	4	0	0	4	2
11.	EE8691	Embedded Systems	ES	3	3	0	0	3

PROFESSIONAL CORE (PC)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EE8251	Circuit Theory	PC	4	2	2	0	3
2.	EE8261	Electric Circuits Laboratory	PC	4	0	0	4	2
3.	EE8351	Digital Logic Circuits	PC	4	2	2	0	3
4.	EE8391	Electromagnetic Theory	PC	4	2	2	0	3
5.	EE8301	Electrical Machines - I	PC	4	2	2	0	3
6.	EE8311	Electrical Machines Laboratory - I	PC	4	0	0	4	2
7.	EE8401	Electrical Machines - II	PC	4	2	2	0	3
8.	EE8402	Transmission and Distribution	PC	3	3	0	0	3
9.	EE8403	Measurements and Instrumentation	PC	3	3	0	0	3
10.	EE8451	Linear Integrated Circuits and Applications	PC	3	3	0	0	3
11.	IC8451	Control Systems	PC	5	3	2	0	4
12.	EE8411	Electrical Machines Laboratory II	PC	4	0	0	4	2

13.	EE8461	Linear and Digital Integrated Circuits Laboratory	PC	4	0	0	4	2
14.	EE8501	Power System Analysis	PC	3	3	0	0	3
15.	EE8551	Microprocessors and Microcontrollers	PC	3	3	0	0	3
16.	EE8552	Power Electronics	PC	3	3	0	0	3
17.	EE8591	Digital Signal Processing	PC	4	2	2	0	3
18.	EE8511	Control and Instrumentation Laboratory	PC	4	0	0	4	2
19.	EE8601	Solid State Drives	PC	3	3	0	0	3
20.	EE8602	Protection and Switchgear	PC	3	3	0	0	3
21.	EE8661	Power Electronics and Drives Laboratory	PC	4	0	0	4	2
22.	EE8681	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
23.	EE8701	High Voltage Engineering	PC	3	3	0	0	3
24.	EE8702	Power System Operation and Control	PC	3	3	0	0	3
25.	EE8703	Renewable Energy Systems	PC	3	3	0	0	3
26.	EE8711	Power System Simulation Laboratory	PC	4	0	0	4	2
27.	EE8712	Renewable Energy Systems Laboratory	PC	4	0	0	4	2

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EE8412	Technical seminar	EEC	2	0	0	2	1
2.	HS8581	Professional Communication	EEC	2	0	0	2	1
3.	EE8611	Mini Project	EEC	4	0	0	4	2
4.	EE8811	Project work	EEC	20	0	0	20	10

SUMMARY

S.NO.	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL
		I	II	III	IV	V	VI	VII	VIII	
1.	HS	4	7	-	-	-	-	-		11
2.	BS	12	7	4	4	-	-	-		27
3.	ES	9	6	8	-	5	3	-		31
4.	PC	-	5	11	20	14	10	13	-	73
5.	PE						6	6	6	18
6.	OE					3	-	3		6
7.	EEC				1	1	2		10	14
	Total	25	25	23	25	23	21	22	16	180
	Non Credit / Mandatory	-	-	-	-	-	-	-	-	0

HS8151	COMMUNICATIVE ENGLISH	L	T	P	C
		4	0	0	4

OBJECTIVES:

To develop the basic reading and writing skills of first year engineering and technology students.

To help learners develop their listening skills, which will, enable them listen to lectures and comprehend them by asking questions; seeking clarifications.

To help learners develop their speaking skills and speak fluently in real contexts.

To help learners develop vocabulary of a general kind by developing their reading skills

UNIT I SHARING INFORMATION RELATED TO ONESELF/FAMILY& FRIENDS 12

Reading- short comprehension passages, practice in skimming-scanning and predicting- Writing-completing sentences- - developing hints. Listening- short texts- short formal and informal conversations. Speaking- introducing oneself - exchanging personal information- Language development- Wh- Questions- asking and answering-yes or no questions- parts of speech. Vocabulary development-- prefixes- suffixes- articles.- count/ uncount nouns.

UNIT II GENERAL READING AND FREE WRITING 12

Reading - comprehension-pre-reading-post reading- comprehension questions (multiple choice questions and /or short questions/ open-ended questions)-inductive reading- short narratives and descriptions from newspapers including dialogues and conversations (also used as short Listening texts)- register- Writing – paragraph writing- topic sentence- main ideas- free writing, short narrative descriptions using some suggested vocabulary and structures –Listening- telephonic conversations. Speaking – sharing information of a personal kind—greeting – taking leave- Language development – prepositions, conjunctions Vocabulary development- guessing meanings of words in context.

UNIT IIIGRAMMAR AND LANGUAGE DEVELOPMENT 12

Reading- short texts and longer passages (close reading) Writing- understanding text structure- use of reference words and discourse markers-coherence-jumbled sentences Listening – listening to longer texts and filling up the table- product description- narratives from different sources. Speaking-asking about routine actions and expressing opinions. Language development- degrees of comparison- pronouns- direct vs indirect questions- Vocabulary development – single word substitutes- adverbs.

UNIT IV READING AND LANGUAGE DEVELOPMENT 12

Reading- comprehension-reading longer texts- reading different types of texts- magazines Writing-letter writing, informal or personal letters-e-mails-conventions of personal email- Listening- listening to dialogues or conversations and completing exercises based on them. Speaking- speaking about oneself- speaking about one's friend- Language development- Tenses- simple present-simple past-present continuous and past continuous- Vocabulary development- synonyms-antonyms- phrasal verbs

UNIT V EXTENDED WRITING 12

Reading- longer texts- close reading –Writing- brainstorming -writing short essays – developing an outline- identifying main and subordinate ideas- dialogue writing-Listening – listening to talks-conversations- Speaking – participating in conversations- short group conversations-Language development-modal verbs- present/ past perfect tense - Vocabulary development-collocations-fixed and semi-fixed expressions

TOTAL: 60 PERIODS

OUTCOMES: At the end of the course, learners will be able to:

Read articles of a general kind in magazines and newspapers.

Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.

Comprehend conversations and short talks delivered in English

Write short essays of a general kind and personal letters and emails in English.

TEXT BOOKS:

Board of Editors. Using English A Coursebook for Undergarduate Engineers and Technologists. Orient BlackSwan Limited, Hyderabad: 2015

Richards, C. Jack. Interchange Students' Book-2 New Delhi: CUP, 2015.

REFERENCES

Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge,2011.

Comfort, Jeremy, et al. Speaking Effectively : Developing Speaking Skillsfor BusinessEnglish. Cambridge University Press, Cambridge: Reprint 2011

Dutt P. Kiranmai and RajeevanGeeta. Basic Communication Skills, Foundation Books: 2013

Means,L. Thomas and Elaine Langlois. English & Communication For Colleges. CengageLearning ,USA: 2007

Redston, Chris &Gillies Cunningham Face2Face (Pre-intermediate Student's Book& Workbook) Cambridge University Press, New Delhi: 2005

MA8151 ENGINEERING MATHEMATICS - I

L	T	P	C
4	0	0	4

OBJECTIVES :

The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT I DIFFERENTIAL CALCULUS 12

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT III INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

UNIT V DIFFERENTIAL EQUATIONS 12

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients - Method of undetermined coefficients.

TOTAL : 60 PERIODS

OUTCOMES :

After completing this course, students should demonstrate competency in the following skills:

Use both the limit definition and rules of differentiation to differentiate

functions. Apply differentiation to solve maxima and minima problems.

Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.

Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.

Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.

Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.

Apply various techniques in solving differential equations.

TEXT BOOKS :

Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015. [For Units I & III - Sections 1.1, 2.2, 2.3, 2.5, 2.7(Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1(Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :

Anton, H, Bivens, I and Davis, S, "Calculus", Wiley, 10th Edition, 2016.

Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.

3. **Narayanan, S. and Manicavachagom Pillai, T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.**

Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.

Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016.

PH8151	ENGINEERING PHYSICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I PROPERTIES OF MATTER 9

Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT II WAVES AND FIBER OPTICS 9

Oscillatory motion – forced and damped oscillations: differential equation and its solution – plane progressive waves – wave equation. Lasers : population of energy levels, Einstein's A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle -

types of optical fibres (material, refractive index, mode) – losses associated with optical fibers - fibre optic sensors: pressure and displacement.

UNIT III THERMAL PHYSICS 9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conduction, convection and radiation – heat conductions in solids – thermal conductivity - Forbe's and Lee's disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT IV QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunnelling (qualitative) - scanning tunnelling microscope.

UNIT V CRYSTAL PHYSICS 9

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults – role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course,

the students will gain knowledge on the basics of properties of matter and its applications,

the students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,

the students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,

the students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and

the students will understand the basics of crystals, their structures and different crystal growth techniques.

TEXT BOOKS:

Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.

Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.

Pandey, B.K. & Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012.

REFERENCES:

Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.

Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning, 2010.

Tipler, P.A. & Mosca, G. "Physics for Scientists and Engineers with Modern Physics'. W.H.Freeman, 2007.

CY8151 ENGINEERING CHEMISTRY LTPC

3 0 0 3

OBJECTIVES:

To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.

To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.

Preparation, properties and applications of engineering materials.

Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT I WATER AND ITS TREATMENT 9

Hardness of water – types – expression of hardness – units – estimation of hardness of water by EDTA – numerical problems – boiler troubles (scale and sludge) – treatment of boiler feed water – Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) external treatment

– Ion exchange process, zeolite process – desalination of brackish water - Reverse Osmosis.

UNIT II SURFACE CHEMISTRY AND CATALYSIS 9

Adsorption: Types of adsorption – adsorption of gases on solids – adsorption of solute from solutions – adsorption isotherms – Freundlich's adsorption isotherm – Langmuir's adsorption isotherm – contact theory – kinetics of surface reactions, unimolecular reactions, Langmuir - applications of adsorption on pollution abatement.

Catalysis: Catalyst – types of catalysis – criteria – autocatalysis – catalytic poisoning and catalytic promoters - acid base catalysis – applications (catalytic convertor) – enzyme catalysis– Michaelis – Menten equation.

UNIT III ALLOYS AND PHASE RULE 9

Alloys: Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Nichrome and stainless steel (18/8) – heat treatment of steel. Phase rule: Introduction, definition of terms with examples, one component system -water system - reduced phase rule - thermal analysis and cooling curves - two component systems - lead-silver system - Pattinson process.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - manufacture of synthetic petrol (Bergius process) - knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - power alcohol and biodiesel. Combustion of fuels: Introduction - calorific value - higher and lower calorific values- theoretical calculation of calorific value - ignition temperature - spontaneous ignition temperature - explosive range - flue gas analysis (ORSAT Method).

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant - breeder reactor - solar energy conversion - solar cells - wind energy. Batteries, fuel cells and supercapacitors: Types of

batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells – H_2-O_2 fuel cell.

TOTAL: 45 PERIODS

OUTCOMES:

The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015

P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015

S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD, New Delhi, 2013.

REFERENCES:

Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.

Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015.

Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2015.

GE8151 PROBLEM SOLVING AND PYTHON PROGRAMMING LTPC 3003

COURSE OBJECTIVES:

To know the basics of algorithmic problem solving

To read and write simple Python programs.

To develop Python programs with conditionals and loops. To define Python functions and call them.

To use Python data structures –- lists, tuples, dictionaries. To do input/output with files in Python.

UNIT I ALGORITHMIC PROBLEM SOLVING 9

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

COURSE OUTCOMES:

Upon completion of the course, students will be able to

- **Develop algorithmic solutions to simple computational problems**
- **Read, write, execute by hand simple Python programs.**
- **Structure simple Python programs for solving problems.**
- **Decompose a Python program into functions.**
- **Represent compound data using Python lists, tuples, dictionaries.**
- **Read and write data from/to files in Python Programs.**

TOTAL : 45 PERIODS

TEXT BOOKS:

1. **Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)**
2. **Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.**

REFERENCES:

1. **Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.**
2. **John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013**
3. **Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.**
4. **Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC, 2013.**
5. **Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.**
6. **Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.**

GE8152 ENGINEERING GRAPHICS L T P C

2 0 4 4

OBJECTIVES:

To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.

T o expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination) 1

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING 7+12

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 5+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 5+12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12 Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method .

TOTAL: 90 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

familiarize with the fundamentals and standards of Engineering graphics

perform freehand sketching of basic geometrical constructions and multiple views of objects. project orthographic projections of lines and plane surfaces.

draw projections and solids and development of surfaces.

visualize and to project isometric and perspective sections of simple solids.

TEXT BOOK:

Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

REFERENCES:

Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.

Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.

Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

N S Parthasarathy And Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.

Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.

Publication of Bureau of Indian Standards:

IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.

IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.

IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.

IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.

IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

There will be five questions, each of either or type covering all units of the syllabus.

All questions will carry equal marks of 20 each making a total of 100.

The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.

The examination will be conducted in appropriate sessions on the same day

GE8161	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	LTPC 004 2

COURSE OBJECTIVES:

To write, test, and debug simple Python programs.

To implement Python programs with conditionals and loops. Use functions for structuring Python programs. Represent compound data using Python lists, tuples, dictionaries. Read and write data from/to files in Python.

LIST OF PROGRAMS

Compute the GCD of two numbers.
Find the square root of a number (Newton's method)
Exponentiation (power of a number)
Find the maximum of a list of numbers
Linear search and Binary search
Selection sort, Insertion sort
Merge sort
First n prime numbers
Multiply matrices
Programs that take command line arguments (word count)
Find the most frequent words in a text read from a file
Simulate elliptical orbits in Pygame
Simulate bouncing ball using Pygame

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

COURSE OUTCOMES:

Upon completion of the course, students will be able to

Write, test, and debug simple Python programs.
Implement Python programs with conditionals and loops.
Develop Python programs step-wise by defining functions and calling them.
Use Python lists, tuples, dictionaries for representing compound data.
Read and write data from/to files in Python.

TOTAL :60 PERIODS

BS8161	**PHYSICS AND CHEMISTRY LABORATORY**	**L**	**T**	**P**	**C**
	(Common to all branches of B.E. / B.Tech Programmes)	**0**	**0**	**4**	**2**

OBJECTIVES:

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

Determination of rigidity modulus – Torsion pendulum
Determination of Young's modulus by non-uniform bending method
(a) Determination of wavelength, and particle size using Laser
(b) Determination of acceptance angle in an optical fiber.
Determination of thermal conductivity of a bad conductor – Lee's Disc method.
Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
Determination of wavelength of mercury spectrum – spectrometer grating
Determination of band gap of a semiconductor
Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

apply principles of elasticity, optics and thermal properties for engineering applications.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:

To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

To acquaint the students with the determination of molecular weight of a polymer by viscometery.

Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.

Determination of total, temporary & permanent hardness of water by EDTA method.

Determination of DO content of water sample by Winkler's method.

Determination of chloride content of water sample by argentometric method.

Estimation of copper content of the given solution by Iodometry.

Determination of strength of given hydrochloric acid using pH meter.

Determination of strength of acids in a mixture of acids using conductivity meter.

Estimation of iron content of the given solution using potentiometer.

Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).

Estimation of sodium and potassium present in water using flame photometer.

Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

Pseudo first order kinetics-ester hydrolysis.

Corrosion experiment-weight loss method.

Determination of CMC.

Phase change in a solid.

Conductometric titration of strong acid vs strong base.

OUTCOMES:

The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

TOTAL: 30 PERIODS

TEXTBOOKS:

1. **Vogel's Textbook of Quantitative Chemical Analysis (8^{TH} edition, 2014)**

HS8251 TECHNICAL ENGLISH L T P C 4004

OBJECTIVES: The Course prepares second semester engineering and Technology students to:

- **Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.**
- **Foster their ability to write convincing job applications and effective reports.**
- **Develop their speaking skills to make technical presentations , participate in group discussions.**
- **Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialisation.**

UNIT I INTRODUCTION TECHNICAL ENGLISH 12

Listening- Listening to talks mostly of a scientific/technical nature and completing information-gap exercises- Speaking –Asking for and giving directions- Reading – reading short technical texts from journals- newsapapers- Writing- purpose statements – extended definitions – issue- writing instructions – checklists-recommendations-Vocabulary Development- technical vocabulary Language Development –subject verb agreement - compound words.

UNIT II READING AND STUDY SKILLS 12

Listening- Listening to longer technical talks and completing exercises based on them- Speaking – describing a process-Reading – reading longer technical texts- identifying the various transitions in a text- paragraphing- Writing- interpreting cgarts, graphs- Vocabulary Development-vocabularyused in formal letters/emails and reports Language Development- impersonal passive voice, numerical adjectives.

UNIT III TECHNICAL WRITING AND GRAMMAR 12

Listening- Listening to classroom lectures/ talkls on engineering/technology -Speaking – introduction to technical presentations- Reading – longer texts both general and technical, practice in speed reading; Writing-Describing a process, use of sequence words- Vocabulary Development- sequence words- Misspelled words. Language Development- embedded sentences

UNIT IV REPORT WRITING 12

Listening- Listening to documentaries and making notes. Speaking – mechanics of presentations-Reading – reading for detailed comprehension- Writing- email etiquette- job application – cover letter –Résumé preparation(via email and hard copy)- analytical essays and issue based essays-- Vocabulary Development- finding suitable synonyms-paraphrasing-. Language Development-clauses- if conditionals.

UNIT V GROUP DISCUSSION AND JOB APPLICATIONS 12

Listening- TED/Ink talks; Speaking –participating in a group discussion -Reading– reading and understanding technical articles Writing– Writing reports- minutes of a meeting- accident and survey-Vocabulary Development- verbal analogies Language Development- reported speech

TOTAL : 60 PERIODS

OUTCOMES: At the end of the course learners will be able to:

Read technical texts and write area- specific texts effortlessly.

Listen and comprehend lectures and talks in their area of specialisation successfully.

Speak appropriately and effectively in varied formal and informal contexts.

Write reports and winning job applications.

TEXT BOOKS:

Board of editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016

Sudharshana.N.P and Saveetha. C. English for Technical Communication. Cambridge University Press: New Delhi, 2016.

REFERENCES

Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.

Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007

Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015

Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007

Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice.Oxford University Press: New Delhi,2014.

Students can be asked to read Tagore, Chetan Bhagat and for suplementary reading.

MA8251 ENGINEERING MATHEMATICS – II L T P C

4 0 0 4

OBJECTIVES :

This course is designed to cover topics such as Matrix Algebra, Vector Calculus, Complex Analysis and Laplace Transform. Matrix Algebra is one of the powerful tools to handle practical problems arising in the field of engineering. Vector calculus can be widely used for modelling the various laws of physics. The various methods of complex analysis and Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT I MATRICES 12

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II VECTOR CALCULUS 12 Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and

Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved

surface - Volume integral - Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTIONS 12

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions w z c, cz, $\frac{1}{z}$, z^2 - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour.

UNIT V LAPLACE TRANSFORMS 12 Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

TOTAL: 60 PERIODS

OUTCOMES :

After successfully completing the course, the student will have a good understanding of the following topics and their applications:

Eigenvalues and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.

Gradient, divergence and curl of a vector point function and related identities.

Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.

Analytic functions, conformal mapping and complex integration.

Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

TEXT BOOKS :

1. **Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.**
2. **Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2016.**

REFERENCES :

Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.

Jain R.K. and Iyengar S.R.K., " Advanced Engineering Mathematics ", Narosa Publications, New Delhi , 3rd Edition, 2007.

3. **O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.**

4. Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.
Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

PH8253	PHYSICS FOR ELECTRONICS ENGINEERING (Common to BME, ME, CC, ECE, EEE, E&I, ICE)	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the essential principles of Physics of semiconductor device and Electron transport properties. Become proficient in magnetic, dielectric and optical properties of materials and nano devices.

UNIT I ELECTRICAL PROPERTIES OF MATERIALS 9 Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann -Franz law – Success and failures - electrons in metals – Particle in a three dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential: Bloch thorem – metals and insulators - Energy bands in solids– tight binding approximation - Electron effective mass – concept of hole.

UNIT II SEMICONDUCTOR PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Carrier transport: Velocity-electric field relations – drift and diffusion transport - Einstein's relation – Hall effect and devices – Zener and avalanche breakdown in p-n junctions - Ohmic contacts – tunnel diode - Schottky diode – MOS capacitor - power transistor.

UNIT III MAGNETIC AND DIELECTRIC PROPERTIES OF MATERIALS 9

Magnetism in materials – magnetic field and induction – magnetization - magnetic permeability and susceptibility–types of magnetic materials – microscopic classification of magnetic materials - Ferromagnetism: origin and exchange interaction- saturation magnetization and Curie temperature – Domain Theory. Dielectric materials: Polarization processes – dielectric loss – internal field – Clausius-Mosotti relation- dielectric breakdown – high-k dielectrics.

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and Semiconductors (concepts only) - photo current in a P- N diode – solar cell –photo detectors - LED – Organic LED – Laser diodes – excitons - quantum confined Stark effect – quantum dot laser.

UNIT V NANOELECTRONIC DEVICES 9

Introduction - electron density in bulk material – Size dependence of Fermi energy– quantum confinement – quantum structures - Density of states in quantum well, quantum wire and quantum dot structures –Zener-Bloch oscillations – resonant tunneling – quantum interference effects – mesoscopic structures: conductance fluctuations and coherent transport – Coulomb blockade effects - Single electron phenomena and Single electron Transistor – magnetic semiconductors– spintronics - Carbon nanotubes: Properties and applications.

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, the students will able to

gain knowledge on classical and quantum electron theories, and energy band structuues,

acquire knowledge on basics of semiconductor physics and its applications in various devices, get knowledge on magnetic and dielectric properties of materials,

have the necessary understanding on the functioning of optical materials for optoelectronics,

understand the basics of quantum structures and their applications in spintronics and carbon electronics.

TEXT BOOKS:

Kasap, S.O. "Principles of Electronic Materials and Devices", McGraw-Hill Education, 2007.

Umesh K Mishra & Jasprit Singh, "Semiconductor Device Physics and Design", Springer, 2008.

Wahab, M.A. "Solid State Physics: Structure and Properties of Materials". Narosa Publishing House, 2009.

REFERENCES

Garcia, N. & Damask, A. "Physics for Computer Science Students". Springer-Verlag, 2012.

Hanson, G.W. "Fundamentals of Nanoelectronics". Pearson Education, 2009

Rogers, B., Adams, J. & Pennathur, S. "Nanotechnology: Understanding Small Systems". CRC Press, 2014

BE8252 BASIC CIVIL AND MECHANICAL ENGINEERING LT PC

4 0 0 4

OBJECTIVES:

To impart basic knowledge on Civil and Mechanical Engineering.

To familiarize the materials and measurements used in Civil Engineering.

To provide the exposure on the fundamental elements of civil engineering structures.

To enable the students to distinguish the components and working principle of power plant units, IC engines, and R & AC system.

A – OVER VIEW

UNIT I SCOPE OF CIVIL AND MECHANICAL ENGINEERING 10

Overview of Civil Engineering - Civil Engineering contributions to the welfare of Society – Specialized sub disciplines in Civil Engineering – Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering

Overview of Mechanical Engineering - Mechanical Engineering contributions to the welfare of Society –Specialized sub disciplines in Mechanical Engineering - Production, Automobile, Energy Engineering - Interdisciplinary concepts in Civil and Mechanical Engineering.

B – CIVIL ENGINEERING

UNIT II SURVEYING AND CIVIL ENGINEERING MATERIALS 10

Surveying: Objects – classification – principles – measurements of distances – angles – leveling – determination of areas– contours - examples.

Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel - timber - modern materials

UNIT III BUILDING COMPONENTS AND STRUCTURES 15

Foundations: Types of foundations - Bearing capacity and settlement – Requirement of good foundations.

Civil Engineering Structures: Brickmasonry – stonemasonry – beams – columns – lintels – roofing – flooring – plastering – floor area, carpet area and floor space index - Types of Bridges and Dams – water supply - sources and quality of water - Rain water harvesting - introduction to high way and rail way.

C – MECHANICAL ENGINEERING

UNIT IV INTERNAL COMBUSTION ENGINES AND POWER PLANTS 15

Classification of Power Plants - Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Working principle of steam, Gas, Diesel, Hydro - electric and Nuclear Power plants –- working principle of Boilers, Turbines, Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 10

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system–Layout of typical domestic refrigerator–Window and Split type room Air conditioner.

OUTCOMES:

On successful completion of this course, the student will be able to

- **appreciate the Civil and Mechanical Engineering components of Projects.**
- **explain the usage of construction material and proper selection of construction materials. measure distances and area by surveying**
- **identify the components used in power plant cycle.**
- **demonstrate working principles of petrol and diesel engine.**
- **elaborate the components of refrigeration and Air conditioning cycle.**

TOTAL: 60 PERIODS

TEXTBOOKS:

Shanmugam Gand Palanichamy MS,"Basic Civil and Mechanical Engineering",Tata McGraw Hill PublishingCo.,NewDelhi,1996.

REFERENCES:

Palanikumar, K. Basic Mechanical Engineering, ARS Publications, 2010.
Ramamrutham S.,"Basic Civil Engineering", Dhanpat Rai Publishing Co.(P) Ltd.1999.
Seetharaman S.,"BasicCivil Engineering",AnuradhaAgencies,2005.
ShanthaKumar SRJ.,"Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, 2000.

Venugopal K. and Prahu Raja V., "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam,2000.

EE8251 CIRCUIT THEORY L T P C 2203

OBJECTIVES:

- To introduce electric circuits and its analysis
- To impart knowledge on solving circuit equations using network theorems
- To introduce the phenomenon of resonance in coupled circuits.
- To educate on obtaining the transient response of circuits.
- To introduce Phasor diagrams and analysis of three phase circuits

UNIT I BASIC CIRCUITS ANALYSIS 6+6

Resistive elements - Ohm's Law Resistors in series and parallel circuits – Kirchoffs laws – Mesh current and node voltage - methods of analysis.

UNIT II NETWORK REDUCTION AND THEOREMS FOR DC AND AC IRCUITS 6+6

Network reduction: voltage and current division, source transformation – star delta conversion. Thevenins and Norton Theorems – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem – Millman's theorem.

UNIT III TRANSIENT RESPONSE ANALYSIS 6+6

L and C elements -Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. sinusoidal input.

UNIT IV THREE PHASE CIRCUITS 6+6

A.C. circuits – Average and RMS value - Phasor Diagram – Power, Power Factor and Energy.- Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power measurement in three phase circuits.

UNIT V RESONANCE AND COUPLED CIRCUITS 6+6

Series and parallel resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

TOTAL : 60 PERIODS

OUTCOMES:

- Ability to analyse electrical circuits
- Ability to apply circuit theorems
- Ability to analyse transients

TEXT BOOKS:

William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill publishers, edition, New Delhi, 2013.

Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2013.

Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning India, 2013.

REFERENCES

Chakrabarti A, "Circuits Theory (Analysis and synthesis), Dhanpath Rai & Sons, New Delhi, 1999.

Jegatheesan, R., "Analysis of Electric Circuits," McGraw Hill, 2015.

Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series, McGraw-Hill, New Delhi, 2010.

M E Van Valkenburg, "Network Analysis",Prentice-Hall of India Pvt Ltd, New Delhi, 2015.

Mahadevan, K., Chitra, C., "Electric Circuits Analysis," Prentice-Hall of India Pvt Ltd., New Delhi, 2015.

Richard C. Dorf and James A. Svoboda, "Introduction to Electric Circuits", 7th Edition, John Wiley & Sons, Inc. 2015.

Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", McGraw Hill, 2015.

GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING LTPC

3 0 0 3

OBJECTIVES:

- **To study the nature and facts about environment.**
- **To finding and implementing scientific, technological, economic and political solutions to environmental problems.**
- **To study the interrelationship between living organism and environment.**
- **To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.**
- **To study the dynamic processes and understand the features of the earth‟s interior and surface.**
- **To study the integrated themes and biodiversity, natural resources, pollution control and waste management.**

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local

levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

Public awareness of environmental is at infant stage.

Ignorance and incomplete knowledge has lead to misconceptions

Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS:

Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi,

2006. 37

Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCES :

Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD,New Delhi, 2007.
Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) PVT, LTD, Hydrabad, 2015.
G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.
Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.

GE8261 ENGINEERING PRACTICES LABORATORY L T P C
0 0 4 2

OBJECTIVES:

To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE 13

Buildings:

Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
Study of pipe connections requirements for pumps and turbines.
Preparation of plumbing line sketches for water supply and sewage works.
Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

Study of the joints in roofs, doors, windows and furniture.
Hands-on-exercise:
Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE 18

Welding:

Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
Gas welding practice

Simple Turning and Taper turning
Drilling Practice

Sheet Metal Work:
Forming & Bending:
Model making – Trays and funnels.
Different type of joints.

Machine assembly practice:
Study of centrifugal pump
Study of air conditioner

Demonstration on:
Smithy operations, upsetting, swaging, setting down and bending.
Example – Exercise – Production of hexagonal headed bolt.
Foundry operations like mould preparation for gear and step cone pulley.
Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 13

Residential house wiring using switches, fuse, indicator, lamp and energy meter.
Fluorescent lamp wiring.
Stair case wiring
Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
Measurement of energy using single phase energy meter.
Measurement of resistance to earth of an electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE 16

1. Study of Electronic components and equipments – Resistor, colour coding measurement
of AC signal parameter (peak- peak, rms period, frequency) using CR.
Study of logic gates AND, OR, EX-OR and NOT.
Generation of Clock Signal.
Soldering practice – Components Devices and Circuits – Using general purpose PCB.
Measurement of ripple factor of HWR and FWR.

TOTAL: 60 PERIODS

OUTCOMES:
On successful completion of this course, the student will be able to
fabricate carpentry components and pipe connections including plumbing works. use welding equipments to join the structures.
Carry out the basic machining operations
Make the models using sheet metal works
Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings
Carry out basic home electrical works and appliances Measure the electrical quantities
Elaborate on the components, gates, soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	15 Sets.
2. Carpentry vice (fitted to work bench)	15 Nos.
3. Standard woodworking tools	15 Sets.
4. Models of industrial trusses, door joints, furniture joints	5 each
5. Power Tools: (a) Rotary Hammer	2 Nos
(b) Demolition Hammer	2 Nos
(c) Circular Saw	2 Nos
(d) Planer	2 Nos
(e) Hand Drilling Machine	2 Nos
(f) Jigsaw	2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders	5 Nos.
2. Welding booth with exhaust facility	5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos.
5. Centre lathe	2 Nos.
6. Hearth furnace, anvil and smithy tools	2 Sets.
7. Moulding table, foundry tools	2 Sets.
8. Power Tool: Angle Grinder	2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner	One each.

ELECTRICAL

1. Assorted electrical components for house wiring	15 Sets
2. Electrical measuring instruments	10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp	1 each
4. Megger (250V/500V)	1 No.
5. Power Tools: (a) Range Finder	2 Nos
(b) Digital Live-wire detector	2 Nos

ELECTRONICS

1. Soldering guns	10 Nos.
2. Assorted electronic components for making circuits	50 Nos.
3. Small PCBs	10 Nos.
4. Multimeters	10 Nos.
Study purpose items: Telephone, FM radio, low-voltage power supply	

EE8261	ELECTRIC CIRCUITS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

To simulate various electric circuits using Pspice/ Matlab/e-Sim / Scilab

To gain practical experience on electric circuits and verification of theorems.

LIST OF EXPERIMENTS

Simulation and experimental verification of electrical circuit problems using Kirchhoff's voltage and current laws.

2. **Simulation and experimental verification of electrical circuit problems using Thevenin's theorem.**
3. **Simulation and experimental verification of electrical circuit problems using Norton's theorem.**
4. **Simulation and experimental verification of electrical circuit problems using Superposition theorem.**

Simulation and experimental verification of Maximum Power transfer Theorem.

Study of Analog and digital oscilloscopes and measurement of sinusoidal voltage, frequency and power factor.

Simulation and Experimental validation of R-C electric circuit transients.

Simulation and Experimental validation of frequency response of RLC electric circuit.

Design and Simulation of series resonance circuit.

Design and Simulation of parallel resonant circuits.

Simulation of three phase balanced and unbalanced star, delta networks circuits.

TOTAL: 60 PERIODS

OUTCOMES:

Understand and apply circuit theorems and concepts in engineering applications. Simulate electric circuits.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Regulated Power Supply: 0 – 15 V D.C - 10 Nos / Distributed Power Source.

Function Generator (1 MHz) - 10 Nos.

Single Phase Energy Meter - 1 No.

Digital Storage Oscilloscope (20 MHz) – 1 No.

10 Nos. of PC with Circuit Simulation Software (min 10 Users) (e-Sim / Scilab/ Pspice / MATLAB /other Equivalent software Package) and Printer (1 No.)

AC/DC - Voltmeters (10 Nos.), Ammeters (10 Nos.) and Multi-meters (10 Nos.)

Single Phase Wattmeter – 3 Nos.

Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box - 6 Nos each.

Circuit Connection Boards - 10 Nos.

Necessary Quantities of Resistors, Inductors, Capacitors of various capacities (Quarter Watt to 10 Watt)

MA8353TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

L	T	P	C
4	0	0	4

OBJECTIVES :

To introduce the basic concepts of PDE for solving standard partial differential equations.

To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.

To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.

To acquaint the student with Fourier transform techniques used in wide variety of situations.

To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations – Singular integrals - Solutions of standard types of first order partial differential equations - Lagrange's linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT II FOURIER SERIES 12

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier series – Parseval's identity – Harmonic analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 12

Classification of PDE – Method of separation of variables - Fourier Series Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT IV FOURIER TRANSFORMS 12

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 12

Z-transforms - Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL : 60 PERIODS

OUTCOMES :

Upon successful completion of the course, students should be able to:

Understand how to solve the given standard partial differential equations.

Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.

Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.

Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

TEXT BOOKS :

Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.

Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.

REFERENCES :

Andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SPIE Press, 1999.

Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Edition, Laxmi Publications Pvt. Ltd, 2014.

Erwin Kreyszig, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, India, 2016.

James, G., "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.

Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

EE8351 DIGITAL LOGIC CIRCUITS L T P C 2203

OBJECTIVES:

To study various number systems and simplify the logical expressions using Boolean functions

To study combinational circuits

To design various synchronous and asynchronous circuits.

To introduce asynchronous sequential circuits and PLDs

To introduce digital simulation for development of application oriented logic circuits.

UNIT I NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES 6+6

Review of number systems, binary codes, error detection and correction codes (Parity and Hamming code) - Digital Logic Families - comparison of RTL, DTL, TTL, ECL and MOS families -operation, characteristics of digital logic family.

UNIT II COMBINATIONAL CIRCUITS 6+6

Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps - simplification and implementation of combinational logic – multiplexers and de multiplexers - code converters, adders, subtractors, Encoders and Decoders.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 6+6

Sequential logic- SR, JK, D and T flip flops - level triggering and edge triggering - counters - asynchronous and synchronous type - Modulo counters - Shift registers - design of synchronous sequential circuits – Moore and Melay models- Counters, state diagram; state reduction; state assignment.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS AND PROGRAMMABILITY LOGIC DEVICES 6+6

Asynchronous sequential logic circuits-Transition tability, flow tability-race conditions, hazards &errors in digital circuits; analysis of asynchronous sequential logic circuits-introduction to Programmability Logic Devices: PROM – PLA –PAL, CPLD-FPGA.

UNIT V VHDL 6+6

RTL Design – combinational logic – Sequential circuit – Operators – Introduction to Packages – Subprograms – Test bench. (Simulation /Tutorial Examples: adders, counters, flip flops, Multiplexers & De multiplexers).

TOTAL : 60 PERIODS

OUTCOMES:

Ability to design combinational and sequential Circuits. Ability to simulate using software package.

Ability to study various number systems and simplify the logical expressions using Boolean functions

Ability to design various synchronous and asynchronous circuits.

Ability to introduce asynchronous sequential circuits and PLDs

Ability to introduce digital simulation for development of application oriented logic circuits.

TEXT BOOKS:

James W. Bignel, Digital Electronics, Cengage learning, 5th Edition, 2007.

M. Morris Mano, 'Digital Design with an introduction to the VHDL', Pearson Education, 2013.

Comer "Digital Logic & State Machine Design, Oxford, 2012.

REFERENCES

Mandal, "Digital Electronics Principles & Application, McGraw Hill Edu, 2013.

William Keitz, Digital Electronics-A Practical Approach with VHDL, Pearson, 2013.

Thomas L.Floyd, 'Digital Fundamentals', 11th edition, Pearson Education, 2015.

Charles H.Roth, Jr, Lizy Lizy Kurian John, 'Digital System Design using VHDL, Cengage, 2013.

D.P.Kothari,J.S.Dhillon, 'Digital circuits and Design',Pearson Education, 2016.

EE8391 ELECTROMAGNETIC THEORY L T P C 2203

OBJECTIVES:

To introduce the basic mathematical concepts related to electromagnetic vector fields To impart knowledge on the concepts of

Electrostatic fields, electrical potential, energy density and their applications.

Magneto static fields, magnetic flux density, vector potential and its applications.

Different methods of emf generation and Maxwell's equations

Electromagnetic waves and characterizing parameters

UNIT I ELECTROSTATICS – I 6+6

Sources and effects of electromagnetic fields – Coordinate Systems – Vector fields – Gradient, Divergence, Curl – theorems and applications - Coulomb's Law – Electric field intensity – Field due to discrete and continuous charges – Gauss's law and applications.

UNIT II ELECTROSTATICS – II 6+6

Electric potential – Electric field and equipotential plots, Uniform and Non- Uniform field, Utilization factor – Electric field in free space, conductors, dielectrics - Dielectric polarization – Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson's and Laplace's equations, Capacitance, Energy density, Applications.

UNIT III MAGNETOSTATICS 6+6

Lorentz force, magnetic field intensity (H) – Biot–Savart's Law - Ampere's Circuit Law – H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization, Magnetic field in multiple media – Boundary conditions, scalar and vector potential, Poisson's Equation, Magnetic force, Torque, Inductance, Energy density, Applications.

UNIT IV ELECTRODYNAMIC FIELDS 6+6

Magnetic Circuits - Faraday's law – Transformer and motional EMF – Displacement current - Maxwell's equations (differential and integral form) – Relation between field theory and circuit theory – Applications.

UNIT V ELECTROMAGNETIC WAVES 6+6

Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors- skin depth - Poynting vector – Plane wave reflection and refraction.

TOTAL : 60 PERIODS

OUTCOMES:

Ability to understand the basic mathematical concepts related to electromagnetic vector fields.

Ability to understand the basic concepts about electrostatic fields, electrical potential, energy density and their applications.

Ability to acquire the knowledge in magneto static fields, magnetic flux density, vector potential and its applications.

Ability to understand the different methods of emf generation and Maxwell's equations

Ability to understand the basic concepts electromagnetic waves and characterizing parameters

Ability to understand and compute Electromagnetic fields and apply them for design and analysis of electrical equipment and systems

TEXT BOOKS:

Mathew N. O. Sadiku, 'Principles of Electromagnetics', 6th Edition, Oxford University Press Inc. Asian edition, 2015.

William H. Hayt and John A. Buck, 'Engineering Electromagnetics', McGraw Hill Special Indian edition, 2014.

Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 2010.

REFERENCES

V.V.Sarwate, 'Electromagnetic fields and waves', First Edition, Newage Publishers, 1993.

J.P.Tewari, 'Engineering Electromagnetics - Theory, Problems and Applications', Second Edition, Khanna Publishers.

Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Third Edition (Schaum's Outline Series), McGraw Hill, 2010.

S.P.Ghosh, Lipika Datta, 'Electromagnetic Field Theory', First Edition, McGraw Hill Education(India) Private Limited, 2012.

K A Gangadhar, 'Electromagnetic Field Theory', Khanna Publishers; Eighth Reprint : 2015

EE8301		L	T	P	C
	ELECTRICAL MACHINES – I	2	2	0	3

OBJECTIVES:

To impart knowledge on the following Topics

Magnetic-circuit analysis and introduce magnetic materials

Constructional details, the principle of operation, prediction of performance, the methods of testing the transformers and three phase transformer connections.

Working principles of electrical machines using the concepts of electromechanical energy conversion principles and derive expressions for generated voltage and torque developed in all Electrical Machines.

Working principles of DC machines as Generator types, determination of their no-load/load characteristics, starting and methods of speed control of motors.

Various losses taking place in D.C. Motor and to study the different testing methods to arrive at their performance.

UNIT I MAGNETIC CIRCUITS AND MAGNETIC MATERIALS 6+6

Magnetic circuits –Laws governing magnetic circuits - Flux linkage, Inductance and energy – Statically and Dynamically induced EMF - Torque – Properties of magnetic materials, Hysteresis and Eddy Current losses - AC excitation, introduction to permanent magnets- Transformer as a magnetically coupled circuit.

UNIT II TRANSFORMERS 6+6

Construction – principle of operation – equivalent circuit parameters – phasor diagrams, losses – testing – efficiency and voltage regulation-all day efficiency-Sumpner's test, per unit representation – inrush current - three phase transformers-connections – Scott Connection – Phasing of transformer– parallel operation of three phase transformers-auto transformer – tap changing transformers- tertiary winding.

UNIT III ELECTROMECHANICAL ENERGY CONVERSION AND CONCEPTS IN ROTATING MACHINES 6+6

Energy in magnetic system – Field energy and co energy-force and torque equations – singly and multiply excited magnetic field systems-mmf of distributed windings – Winding Inductances-, magnetic fields in rotating machines – rotating mmf waves – magnetic

saturation and leakage fluxes.

UNIT IV DC GENERATORS 6+6

Construction and components of DC Machine – Principle of operation - Lap and wave windings-EMF equations– circuit model – armature reaction –methods of excitation-

commutation - interpoles compensating winding –characteristics of DC generators.

UNIT V DC MOTORS 6+6

Principle and operations - types of DC Motors – Speed Torque Characteristics of DC Motors-starting and speed control of DC motors –Plugging, dynamic and regenerative braking-testing and efficiency – Retardation test- Swinburne's test and Hopkinson's test - Permanent Magnet DC (PMDC)motors-applications of DC Motor

TOTAL : 60 PERIODS

OUTCOMES:

- **Ability to analyze the magnetic-circuits.**
- **Ability to acquire the knowledge in constructional details of transformers.**
- **Ability to understand the concepts of electromechanical energy conversion.**
- **Ability to acquire the knowledge in working principles of DC Generator.**
- **Ability to acquire the knowledge in working principles of DC Motor**
- **Ability to acquire the knowledge in various losses taking place in D.C. Machines**

TEXT BOOKS:

- **Stephen J. Chapman, 'Electric Machinery Fundamentals'4th edition, McGraw Hill Education Pvt. Ltd, 2010.**
- **P.C. Sen'Principles of Electric Machines and Power Electronics' John Wiley & Sons; 3rd Edition 2013.**
- **Nagrath, I.J. and Kothari.D.P., Electric Machines', McGraw-Hill Education, 2004**

REFERENCES

- **Theodore Wildi, "Electrical Machines, Drives, and Power Systems", Pearson Education., (5th Edition), 2002.**
- **B.R. Gupta ,'Fundamental of Electric Machines' New age International Publishers,3rd Edition ,Reprint 2015.**
- **S.K. Bhattacharya, 'Electrical Machines' McGraw - Hill Education, New Delhi, 3rd Edition,2009.**
- **Vincent Del Toro, 'Basic Electric Machines' Pearson India Education, 2016.**
- **Surinder Pal Bali, 'Electrical Technology Machines & Measurements, Vol.II, Pearson, 2013.**
- **Fitzgerald. A.E., Charles Kingsely Jr, Stephen D.Umans, 'Electric Machinery', Sixth edition, McGraw Hill Books Company, 2003.**

EC8353 ELECTRON DEVICES AND CIRCUITS L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- **Understand the structure of basic electronic devices.**
- **Be exposed to active and passive circuit elements.**
- **Familiarize the operation and applications of transistor like BJT and FET.**
- **Explore the characteristics of amplifier gain and frequency response.**
- **Learn the required functionality of positive and negative feedback systems.**

UNIT I PN JUNCTION DEVICES 9

PN junction diode –structure, operation and V-I characteristics, diffusion and transition capacitance - Rectifiers – Half Wave and Full Wave Rectifier,– Display devices- LED, Laser diodes, Zener diodecharacteristics- Zener Reverse characteristics – Zener as regulator

UNIT II TRANSISTORS AND THYRISTORS 9

BJT, JFET, MOSFET- structure, operation, characteristics and Biasing UJT, Thyristors and IGBT - Structure and characteristics.

UNIT III AMPLIFIERS 9

BJT small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response – MOSFET small signal model– Analysis of CS and Source follower – Gain and frequency response- High frequency analysis.

UNIT IV MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER 9

BIMOS cascade amplifier, Differential amplifier – Common mode and Difference mode analysis – FET input stages – Single tuned amplifiers – Gain and frequency response – Neutralization methods, power amplifiers –Types (Qualitative analysis).

UNIT V FEEDBACK AMPLIFIERS AND OSCILLATORS 9

Advantages of negative feedback – voltage / current, series , Shunt feedback –positive feedback – Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.

TOTAL : 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be ability to:

- **Explain the structure and working operation of basic electronic devices.**
- **Able to identify and differentiate both active and passive elements**
- **Analyze the characteristics of different electronic devices such as diodes and transistors**
- **Choose and adapt the required components to construct an amplifier circuit.**
- **Employ the acquired knowledge in design and analysis of oscillators**

TEXT BOOKS:

1. . David A. Bell ,"Electronic devices and circuits", Oxford University higher education, 5th edition 2008.

Sedra and smith, "Microelectronic circuits",7th Ed., Oxford

REFERENCES:

Balbir Kumar, Shail.B.Jain, "Electronic devices and circuits" PHI learning private limited, 2nd edition 2014.

Thomas L.Floyd, "Electronic devices" Conventional current version, Pearson prentice hall, 10th Edition, 2017.

Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGraw Hill, 3rd Edition, 2003.

Robert L.Boylestad, "Electronic devices and circuit theory", 2002.

Robert B. Northrop, "Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation", CRC Press, 2004.

ME8792	POWER PLANT ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE:

Providing an overview of Power Plants and detailing the role of Mechanical Engineers in their operation and maintenance.

UNIT I COAL BASED THERMAL POWER PLANTS 9

Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants – Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration systems.

UNIT II DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS 9

Otto, Diesel, Dual & Brayton Cycle - Analysis & Optimisation. Components of Diesel and Gas Turbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cycle systems.

UNIT III NUCLEAR POWER PLANTS 9

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors : Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANada Deuterium- Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

UNIT IV POWER FROM RENEWABLE ENERGY 9

Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, Solar Photo Voltaic (SPV),
Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.

UNIT V ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS 9

Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

TOTAL : 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the layout, construction and working of the components inside a thermal power plant.

CO2 Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.

CO3 Explain the layout, construction and working of the components inside nuclear power plants.

CO4 Explain the layout, construction and working of the components inside Renewable energy power plants.

CO5 Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.

TEXT BOOK:

Nag. P.K., "Power Plant Engineering", Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008.

REFERENCES:

El-Wakil. M.M., "Power Plant Technology", Tata McGraw – Hill Publishing Company Ltd., 2010.

Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.

Thomas C. Elliott, Kao Chen and Robert C. Swanekamp, "Power Plant Engineering", Second Edition, Standard Handbook of McGraw – Hill, 1998.

EC8311	ELECTRONICS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

To enability the students to understand the behavior of semiconductor device based on experimentation.

LIST OF EXPERIMENTS

Characteristics of Semiconductor diode and Zener diode

Characteristics of a NPN Transistor under common emitter , common collector and common base configurations

Characteristics of JFET and draw the equivalent circuit

Characteristics of UJT and generation of saw tooth waveforms

Design and Frequency response characteristics of a Common Emitter amplifier

Characteristics of photo diode & photo transistor, Study of light activated relay circuit

Design and testing of RC phase shift and LC oscillators

Single Phase half-wave and full wave rectifiers with inductive and capacitive filters

Differential amplifiers using FET

Study of CRO for frequency and phase measurements 50

Realization of passive filters

TOTAL: 60 PERIODS

OUTCOMES:

Ability to understand and analyse electronic circuits.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. **Semiconductor devices like Diode, Zener Diode, NPN Transistors, JFET, UJT, Photo diode, Photo Transistor**
   Resistors, Capacitors and inductors
   Necessary digital IC 8
4. **Function Generators 10**
5. **Regulated 3 output Power Supply 5, ± 15V 10**
6. **CRO 10**
7. **Storage Oscilloscope 1**
   Bread boards
   Atleast one demo module each for the listed

equipments. 10. Component data sheets to be provided

EE8311	**ELECTRICAL MACHINES LABORATORY-I**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

OBJECTIVES:

To expose the students to the operation of D.C. machines and transformers and give them experimental skill.

LIST OF EXPERIMENTS

Open circuit and load characteristics of DC shunt generator- critical resistance and critical speed.

Load characteristics of DC compound generator with differential and cumulative connections.

Load test on DC shunt motor.

Load test on DC compound motor.

Load test on DC series motor.

Swinburne's test and speed control of DC shunt motor.

Hopkinson's test on DC motor – generator set.

Load test on single-phase transformer and three phase transformers.

Open circuit and short circuit tests on single phase transformer.

Sumpner's test on single phase transformers.

Separation of no-load losses in single phase transformer.

12 Study of starters and 3-phase transformers connections.

TOTAL: 60 PERIODS

OUTCOMES:

Ability to understand and analyze DC Generator 51

Ability to understand and analyze DC Motor
Ability to understand and analyse Transformers.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

DC Shunt Motor with Loading Arrangement – 3 nos

DC Shunt Motor Coupled with Three phase Alternator – 1 No.

Single Phase Transformer – 4 nos

DC Series Motor with Loading Arrangement – 1 No.

DC compound Motor with Loading Arrangement – 1 No.

Three Phase Induction Motor with Loading Arrangement – 2 nos

Single Phase Induction Motor with Loading Arrangement – 1 No.

DC Shunt Motor Coupled With DC Compound Generator – 2 nos

DC Shunt Motor Coupled With DC Shunt Motor – 1 No.

Tachometer -Digital/Analog – 8 nos

Single Phase Auto Transformer – 2 nos

Three Phase Auto Transformer – 1 No.

Single Phase Resistive Loading Bank – 2 nos

Three Phase Resistive Loading Bank. – 2 nos

MA8491	NUMERICAL METHODS	L	T	P	C
		4	0	0	4

OBJECTIVES :

To introduce the basic concepts of solving algebraic and transcendental equations. To introduce the numerical techniques of interpolation in various intervals in real life situations.
To acquaint the student with understanding of numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.
To understand the knowledge of various techniques and methods of solving various types of partial differential equations.

UNIT ISOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT II INTERPOLATION AND APPROXIMATION 12

Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines - Difference operators and relations - Interpolation with equal intervals - Newton's forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 12

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's Method - Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single step methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge - Kutta method for solving first order equations - Multi step methods - Milne's and Adams - Bash forth predictor corrector methods for solving first order equations.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 12 Finite difference methods for solving second order two - point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method.

TOTAL : 60 PERIODS

OUTCOMES :

Upon successful completion of the course, students should be able to:

Understand the basic concepts and techniques of solving algebraic and transcendental equations.

Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations.

Apply the numerical techniques of differentiation and integration for engineering problems.

Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXTBOOKS :

Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.

Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna

Brian Bradie, "A Friendly Introduction to Numerical Analysis", Pearson Education, Asia, New Delhi, 2007.

Gerald. C. F. and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 6th Edition, New Delhi, 2006.

Mathews, J.H. "Numerical Methods for Mathematics, Science and Engineering", 2nd Edition, Prentice Hall, 1992.

Sankara Rao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt. Ltd, 3rd Edition, New Delhi, 2007.

Sastry, S.S, "Introductory Methods of Numerical Analysis", PHI Learning Pvt. Ltd, 5th Edition, 2015.

EE8401	ELECTRICAL MACHINES – II	L	T	P	C
		2	2	0	3

OBJECTIVES:

To impart knowledge on the following Topics

Construction and performance of salient and non – salient type synchronous generators.

Principle of operation and performance of synchronous motor.

Construction, principle of operation and performance of induction machines. Starting and speed control of three-phase induction motors.

Construction, principle of operation and performance of single phase induction motors and special machines.

UNIT I SYNCHRONOUS GENERATOR 6+6

Constructional details – Types of rotors –winding factors- emf equation – Synchronous reactance – Armature reaction – Phasor diagrams of non salient pole synchronous generator connected to infinite bus--Synchronizing and parallel operation – Synchronizing torque -Change of excitation and mechanical input- Voltage regulation – EMF, MMF, ZPF and A.S.A methods – steady state power- angle characteristics– Two reaction theory –slip test -short circuit transients - Capability Curves

UNIT II SYNCHRONOUS MOTOR 6+6

Principle of operation – Torque equation – Operation on infinite bus bars - V and Inverted V curves – Power input and power developed equations – Starting methods – Current loci for constant power input, constant excitation and constant power developed-Hunting – natural frequency of oscillations – damper windings- synchronous condenser.

UNIT III THREE PHASE INDUCTION MOTOR 6+6

Constructional details – Types of rotors –- Principle of operation – Slip –cogging and crawling- Equivalent circuit – Torque- Slip characteristics - Condition for maximum torque – Losses and efficiency – Load test - No load and blocked rotor tests - Circle diagram – Separation of losses – Double cage induction motors –Induction generators – Synchronous induction motor.

UNIT IV STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR 6+6

Need for starting – Types of starters – DOL, Rotor resistance, Autotransformer and Star-delta starters – Speed control – Voltage control, Frequency control and pole changing – Cascaded connection-V/f control – Slip power recovery scheme-Braking of three phase induction motor: Plugging, dynamic braking and regenerative braking.

UNIT V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES 6+6

Constructional details of single phase induction motor – Double field revolving theory and operation – Equivalent circuit – No load and blocked rotor test – Performance analysis – Starting methods of single-phase induction motors – Capacitor-start capacitor run Induction motor- Shaded pole induction motor - Linear induction motor – Repulsion motor - Hysteresis motor - AC series motor- Servo motors- Stepper motors - introduction to magnetic levitation systems.

TOTAL : 60 PERIODS

OUTCOMES:

Ability to understand the construction and working principle of Synchronous Generator

Ability to understand MMF curves and armature windings.

Ability to acquire knowledge on Synchronous motor.

Ability to understand the construction and working principle of Three phase Induction Motor

Ability to understand the construction and working principle of Special Machines

Ability to predetermine the performance characteristics of Synchronous Machines.

TEXT BOOKS:

A.E. Fitzgerald, Charles Kingsley, Stephen. D. Umans, 'Electric Machinery', Mc Graw Hill publishing Company Ltd, 2003.

Vincent Del Toro, 'Basic Electric Machines' Pearson India Education, 2016.

Stephen J. Chapman, 'Electric Machinery Fundamentals'4th edition, McGraw Hill Education Pvt. Ltd, 2010.

REFERENCES

D.P. Kothari and I.J. Nagrath, 'Electric Machines', McGraw Hill Publishing Company Ltd, 2002.

P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, 2003.

M.N. Bandyopadhyay, Electrical Machines Theory and Practice, PHI Learning PVT LTD., New Delhi, 2009.

B.R.Gupta, 'Fundamental of Electric Machines' New age International Publishers,3rd Edition ,Reprint 2015.

Murugesh Kumar, 'Electric Machines', Vikas Publishing House Pvt. Ltd, 2002.

Alexander S. Langsdorf, 'Theory of Alternating-Current Machinery', McGraw Hill Publications, 2001.

EE8402 TRANSMISSION AND DISTRIBUTION L T P C 3003

OBJECTIVES:

To study the structure of electric power system and to develop expressions for the computation of transmission line parameters.

To obtain the equivalent circuits for the transmission lines based on distance and to determine voltage regulation and efficiency.

To understand the mechanical design of transmission lines and to analyze the voltage distribution in insulator strings to improve the efficiency.

To study the types, construction of cables and methods to improve the efficiency.

To study about distribution systems, types of substations, methods of grounding, EHVAC, HVDC and FACTS.

UNIT I TRANSMISSION LINE PARAMETERS 9

Structure of Power System - Parameters of single and three phase transmission lines with single and double circuits -Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition - application of self and mutual GMD; skin and proximity effects - Typical configurations, conductor types and electrical parameters of EHV lines.

UNIT II MODELLING AND PERFORMANCE OF TRANSMISSION LINES 9

Performance of Transmission lines - short line, medium line and long line - equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance - transmission efficiency and voltage regulation, real and reactive power flow in lines - Power Circle diagrams - Formation of Corona – Critical Voltages – Effect on Line Performance.

UNIT III MECHANICAL DESIGN OF LINES 9

Mechanical design of OH lines – Line Supports –Types of towers – Stress and Sag Calculation – Effects of Wind and Ice loading. Insulators: Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators.

UNIT IV UNDER GROUND CABLES 9

Underground cables - Types of cables – Construction of single core and 3 core cables - Insulation Resistance – Potential Gradient - Capacitance of Single-core and 3 core cables - Grading of cables - Power factor and heating of cables – DC cables.

UNIT V DISTRIBUTION SYSTEMS 9

Distribution Systems – General Aspects – Kelvin's Law – AC and DC distributions - Techniques of Voltage Control and Power factor improvement – Distribution Loss – Types of Substations -Methods of Grounding – Trends in Transmission and Distribution: EHVAC, HVDC and FACTS (Qualitative treatment only).

TOTAL : 45 PERIODS

OUTCOMES:

To understand the importance and the functioning of transmission line parameters. To understand the concepts of Lines and Insulators.

To acquire knowledge on the performance of Transmission lines.

To understand the importance of distribution of the electric power in power system. To acquire knowledge on Underground Cables

To become familiar with the function of different components used in Transmission and Distribution levels of power system and modelling of these components.

TEXT BOOKS:

D.P.Kothari, I.J. Nagarath, 'Power System Engineering', Mc Graw-Hill Publishing Company limited, New Delhi, Second Edition, 2008.

C.L.Wadhwa, 'Electrical Power Systems', New Academic Science Ltd, 2009.

S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.

REFERENCES

B.R.Gupta, 'Power System Analysis and Design' S. Chand, New Delhi, Fifth Edition, 2008.

Luces M.Fualken berry, Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 2007.

Arun Ingole, "power transmission and distribution" Pearson Education, 2017

J.Brian, Hardy and Colin R.Bayliss 'Transmission and Distribution in Electrical Engineering', Newnes; Fourth Edition, 2012.

G.Ramamurthy, "Handbook of Electrical power Distribution," Universities Press, 2013.

V.K.Mehta, Rohit Mehta, 'Principles of power system', S. Chand & Company Ltd, New Delhi, 2013

EE8403 MEASUREMENTS AND INSTRUMENTATION L T P C 3003

OBJECTIVES:

To impart knowledge on the following Topics

- **Basic functional elements of instrumentation**
  - **Fundamentals of electrical and electronic instruments**
  - **Comparison between various measurement techniques**
  - **Various storage and display devices**
- **Various transducers and the data acquisition systems**

UNIT I INTRODUCTION 9

Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration- Principle and types of analog and digital voltmeters, ammeters.

UNIT II ELECTRICAL AND ELECTRONIC INSTRUMENTS 9

Principle and types of multi meters – Single and three phase watt meters and energy meters – Magnetic measurements – Determination of B-H curve and measurements of iron loss – Instrument transformers – Instruments for measurement of frequency and phase.

UNIT III COMPARATIVE METHODS OF MEASUREMENTS 9

D.C potentiometers, D.C (Wheat stone, Kelvin and Kelvin Double bridge) & A.C bridges (Maxwell, Anderson and Schering bridges), transformer ratio bridges, self-balancing bridges. Interference & screening – Multiple earth and earth loops - Electrostatic and electromagnetic Interference – Grounding techniques.

UNIT IV STORAGE AND DISPLAY DEVICES 9

Magnetic disk and tape – Recorders, digital plotters and printers, CRT display, digital CRO, LED, LCD & Dot matrix display – Data Loggers.

UNIT V TRANSDUCERS AND DATA ACQUISITION SYSTEMS 9

Classification of transducers – Selection of transducers – Resistive, capacitive & inductive Transducers – Piezoelectric, Hall effect, optical and digital transducers – Elements of data acquisition system – Smart sensors-Thermal Imagers.

TOTAL : 45 PERIODS

OUTCOMES:

- **To acquire knowledge on Basic functional elements of instrumentation**
  - **To understand the concepts of Fundamentals of electrical and electronic instruments Ability to compare between various measurement techniques**
- **To acquire knowledge on Various storage and display devices**
- **To understand the concepts Various transducers and the data acquisition systems**
  - **Ability to model and analyze electrical and electronic Instruments and understand the operational features of display Devices and Data Acquisition System.**

TEXT BOOKS:

A.K. Sawhney, 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2010.

J. B. Gupta, 'A Course in Electronic and Electrical Measurements', S. K. Kataria & Sons, Delhi, 2013.

Doebelin E.O. and Manik D.N., Measurement Systems – Applications and Design, Special Indian Edition, McGraw Hill Education Pvt. Ltd., 2007.

REFERENCES

H.S. Kalsi, 'Electronic Instrumentation', McGraw Hill, III Edition 2010.

D.V.S. Murthy, 'Transducers and Instrumentation', Prentice Hall of India Pvt Ltd, 2015.

David Bell, ' Electronic Instrumentation & Measurements', Oxford University Press,2013.

Martin Reissland, 'Electrical Measurements', New Age International (P) Ltd., Delhi, 2001.

Alan. S. Morris, Principles of Measurements and Instrumentation, 2nd Edition, Prentice Hall of India, 2003.

EE8451 LINEAR INTEGRATED CIRCUITS AND APPLICATIONS L T P C 3003

OBJECTIVES:

To impart knowledge on the following topics

- **Signal analysis using Op-amp based circuits.**
- **Applications of Op-amp.**
- **Functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits.**
- **IC fabrication procedure.**

UNIT I IC FABRICATION 9

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance, FETs and PV Cell.

UNIT II CHARACTERISTICS OF OPAMP 9

Ideal OP-AMP characteristics, DC characteristics, AC characteristics, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – Inverting and Non-inverting Amplifiers, summer, differentiator and integrator-V/I & I/V converters.

UNIT III APPLICATIONS OF OPAMP 9 Instrumentation amplifier and its applications for transducer Bridge, Log and Antilog

Amplifiers- Analog multiplier & Divider, first and second order active filters, comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R- 2R ladder and weighted resistor types), A/D converters using opamps.

UNIT IV SPECIAL ICs 9

Functional block, characteristics of 555 Timer and its PWM application - IC-566 voltage controlled oscillator IC; 565-phase locked loop IC, AD633 Analog multiplier ICs.

UNIT V APPLICATION ICs 9

AD623 Instrumentation Amplifier and its application as load cell weight measurement - IC voltage regulators –LM78XX, LM79XX; Fixed voltage regulators its application as Linear power supply - LM317, 723 Variability voltage regulators, switching regulator-SMPS - ICL 8038 function generator IC.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to acquire knowledge in IC fabrication procedure

Ability to analyze the characteristics of Op-Amp

To understand the importance of Signal analysis using Op-amp based circuits.

Functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits.

To understand and acquire knowledge on the Applications of Op-amp

Ability to understand and analyse, linear integrated circuits their Fabrication and Application.

TEXT BOOKS:

David A. Bell, 'Op-amp & Linear ICs', Oxford, 2013.

D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits', II edition, New Age, 2003.

Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI. 2000.

REFERENCES

Fiore,"Opamps & Linear Integrated Circuits Concepts & applications", Cengage, 2010.

Floyd ,Buchla,"Fundamentals of Analog Circuits, Pearson, 2013.

Jacob Millman, Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system', McGraw Hill, 2003.

Robert F.Coughlin, Fredrick F. Driscoll, 'Op-amp and Linear ICs', Pearson, 6th edition,2012.

Sergio Franco, 'Design with Operational Amplifiers and Analog Integrated Circuits', Mc Graw Hill, 2016.

Muhammad H. Rashid,' Microelectronic Circuits Analysis and Design' Cengage Learning, 2011.

IC8451 CONTROL SYSTEMS LTPC

3204

COURSE OBJECTIVES

To understand the use of transfer function models for analysis physical systems and introduce the control system components.

To provide adequate knowledge in the time response of systems and steady state error analysis.

To accord basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.

To introduce stability analysis and design of compensators

To introduce state variable representation of physical systems

UNIT I SYSTEMS AND REPRESENTATION 9

Basic elements in control systems: – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs.

UNIT II TIME RESPONSE 9

Time response: – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error – Root locus construction- Effects of P, PI, PID modes of feedback control –Time response analysis.

UNIT III FREQUENCY RESPONSE 9

Frequency response: – Bode plot – Polar plot – Determination of closed loop response from open loop response - Correlation between frequency domain and time domain specifications

UNIT IV STABILITY AND COMPENSATOR DESIGN 9

Characteristics equation – Routh Hurwitz criterion – Nyquist stability criterion- Performance criteria – Effect of Lag, lead and lag-lead compensation on frequency response-Design of Lag, lead and lag-lead compensator using bode plots.

UNIT V STATE VARIABLE ANALYSIS 9

Concept of state variables – State models for linear and time invariant Systems – Solution of state and output equation in controllable canonical form – Concepts of controllability and observability.

TOTAL (L: 45+T:30): 75 PERIODS

COURSE OUTCOMES

At the end of the course, the student should have the :

Ability to develop various representations of system based on the knowledge of Mathematics, Science and Engineering fundamentals.
Ability to do time domain and frequency domain analysis of various models of linear system.
Ability to interpret characteristics of the system to develop mathematical model.
Ability to design appropriate compensator for the given specifications.
Ability to come out with solution for complex control problem.
Ability to understand use of PID controller in closed loop system.

TEXT BOOKS

Nagarath, I.J. and Gopal, M., "Control Systems Engineering", New Age International Publishers, 2017.
Benjamin C. Kuo, "Automatic Control Systems", Wiley, 2014.

REFERENCES

Katsuhiko Ogata, "Modern Control Engineering", Pearson, 2015.
Richard C.Dorf and Bishop, R.H., "Modern Control Systems", Pearson Education,2009.
John J.D., Azzo Constantine, H. and Houpis Sttuart, N Sheldon, "Linear Control System Analysis and Design with MATLAB", CRC Taylor& Francis Reprint 2009.
Rames C.Panda and T. Thyagarajan, "An Introduction to Process Modelling Identification and Control of Engineers", Narosa Publishing House, 2017.
M.Gopal, "Control System: Principle and design", McGraw Hill Education, 2012.
NPTEL Video Lecture Notes on "Control Engineering "by Prof. S. D. Agashe, IIT Bombay.

EE8411 ELECTRICAL MACHINES LABORATORY - II

L	T	P	C
0	0	4	2

OBJECTIVES:

To expose the students to the operation of synchronous machines and induction motors and give them experimental skill.

LIST OF EXPERIMENTS

1. Regulation of three phase alternator by EMF and MMF methods.
2. Regulation of three phase alternator by ZPF and ASA methods.
3. Regulation of three phase salient pole alternator by slip test.
4. Measurements of negative sequence and zero sequence impedance of alternators.
5. V and Inverted V curves of Three Phase Synchronous Motor.
6. Load test on three-phase induction motor.
7. No load and blocked rotor tests on three-phase induction motor (Determination of equivalent circuit parameters).
8. Separation of No-load losses of three-phase induction motor.
9. Load test on single-phase induction motor.
10. No load and blocked rotor test on single-phase induction motor.
11. Study of Induction motor Starters

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should have the :

- Ability to understand and analyze EMF and MMF methods
- Ability to analyze the characteristics of V and Inverted V curves
- Ability to understand the importance of Synchronous machines
- Ability to understand the importance of Induction Machines
- Ability to acquire knowledge on separation of losses

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

- Synchronous Induction motor 3HP – 1 No.
- DC Shunt Motor Coupled With Three phase Alternator – 4 nos
- DC Shunt Motor Coupled With Three phase Slip ring Induction motor – 1 No.
- Three Phase Induction Motor with Loading Arrangement – 2 nos
- Single Phase Induction Motor with Loading Arrangement – 2 nos
- Tachometer -Digital/Analog – 8 nos
- Single Phase Auto Transformer – 2 nos
- Three Phase Auto Transformer – 3 nos
- Single Phase Resistive Loading Bank – 2 nos
- Three Phase Resistive Loading Bank – 2 nos
- Capacitor Bank – 1 No.

EE8461 LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY **L T P C 0 0 4 2**

OBJECTIVES:

To learn design, testing and characterizing of circuit behavior with digital and analog ICs.

LIST OF EXPERIMENTS

Implementation of Boolean Functions, Adder and Subtractor circuits.

Code converters: Excess-3 to BCD and Binary to Gray code converter and vice-versa

Parity generator and parity checking

Encoders and Decoders

Counters: Design and implementation of 3-bit modulo counters as synchronous and Asynchronous types using FF IC's and specific counter IC.

Shift Registers: Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitability IC's.

Study of multiplexer and de multiplexer

Timer IC application: Study of NE/SE 555 timer in Astability, Monostability operation.

Application of Op-Amp: inverting and non-inverting amplifier, Adder, comparator, Integrator and Differentiator.

Voltage to frequency characteristics of NE/ SE 566 IC.

Variability Voltage Regulator using IC LM317.

TOTAL: 60 PERIODS

OUTCOMES:

At the end of the course, the student should have the :

Ability to understand and implement Boolean Functions.
Ability to understand the importance of code conversion
Ability to Design and implement 4-bit shift registers
Ability to acquire knowledge on Application of Op-Amp
Ability to Design and implement counters using specific counter IC.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS: (3 per Batch)

S.No	Name of the equipments / Components	Quantity Required	Remarks
1	Dual ,(0-30V) variability Power Supply	10	-
2	CRO	9	30MHz
3	Digital Multimeter	10	Digital
4	Function Generator	8	1 MHz
5	IC Tester (Analog)	2	
6	Bread board	10	

7	Computer (PSPICE installed)	1	
Consumabilitys (sufficient quantity)			
	IC 741/ IC NE555/566/565		
	Digital IC types		
	LED		
	LM317		
	LM723		
	ICSG3524 / SG3525		
	Transistor – 2N3391		
	Diodes, IN4001,BY126		
	Zener diodes		
	Potentiometer		
	Step-down transformer 230V/12-0-12V		
	Capacitor		
	Resistors 1/4 Watt Assorted		
	Single Strand Wire		

EE8412 **TECHNICAL SEMINAR** **LTPC**
0021

OBJECTIVES:

To encourage the students to study advanced engineering developments
To prepare and present technical reports.
To encourage the students to use various teaching aids such as overhead projectors, power point presentation and demonstrative models.

METHOD OF EVALUATION:

During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for a duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. Each student is expected to present atleast twice during the semester and the student is evaluated based on that. At the end of the semester, he / she can submit a report on his / her topic of seminar and marks are given based on the report. A Faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Evaluation is 100% internal.

TOTAL: 30 PERIODS

OUTCOMES:

Ability to review, prepare and present technological developments Ability to face the placement interviews

EE8501 POWER SYSTEM ANALYSIS L T P C 3003

OBJECTIVES:

To model the power system under steady state operating condition

To understand and apply iterative techniques for power flow analysis

To model and carry out short circuit studies on power system

To model and analyze stability problems in power system

UNIT I POWER SYSTEM 9

Need for system planning and operational studies - Power scenario in India - Power system components – Representation - Single line diagram - per unit quantities - p.u. impedance diagram - p.u. reactance diagram - Network graph, Bus incidence matrix, Primitive parameters, Bus admittance matrix from primitive parameters - Representation of off-nominal transformer - Formation of bus admittance matrix of large power network.

UNIT II POWER FLOW ANALYSIS 9

Bus classification - Formulation of Power Flow problem in polar coordinates - Power flow solution using Gauss Seidel method - Handling of Voltage controlled buses - Power Flow Solution by Newton Raphson method.

UNIT III SYMMETRICAL FAULT ANALYSIS 9

Assumptions in short circuit analysis - Symmetrical short circuit analysis using Thevenin's theorem - Bus Impedance matrix building algorithm (without mutual coupling) - Symmetrical fault analysis through bus impedance matrix - Post fault bus voltages - Fault level - Current limiting reactors.

UNIT IV UNSYMMETRICAL FAULT ANALYSIS 9

Symmetrical components - Sequence impedances - Sequence networks - Analysis of unsymmetrical faults at generator terminals: LG, LL and LLG - unsymmetrical fault occurring at any point in a power system - computation of post fault currents in symmetrical component and phasor domains.

UNIT V STABILITY ANALYSIS 9

Classification of power system stability – Rotor angle stability - Swing equation - Swing curve - Power-Angle equation - Equal area criterion - Critical clearing angle and time - Classical step-by-step solution of the swing equation – modified Euler method.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to model the power system under steady state operating condition

Ability to understand and apply iterative techniques for power flow analysis

Ability to model and carry out short circuit studies on power system

Ability to model and analyze stability problems in power system

Ability to acquire knowledge on Fault analysis.

Ability to model and understand various power system components and carry out power flow, short circuit and stability studies.

TEXT BOOKS:

John J. Grainger, William D. Stevenson, Jr, 'Power System Analysis', Mc Graw Hill Education (India) Private Limited, New Delhi, 2015.

Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw-Hill Education, Second Edition, 2008.

Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.

REFERENCES

Pai M A, 'Computer Techniques in Power System Analysis', Tata Mc Graw-Hill Publishing Company Ltd., New Delhi, Second Edition, 2007.

J. Duncan Glover, Mulukutla S.Sarma, Thomas J. Overbye, 'Power System Analysis & Design', Cengage Learning, Fifth Edition, 2012.

Gupta B.R., 'Power System - Analysis and Design', S. Chand Publishing, 2001.

Kundur P., 'Power System Stability and Control', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.

EE8551	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following Topics

Architecture of µP8085 & µC 8051

Addressing modes & instruction set of 8085 & 8051.

Need & use of Interrupt structure 8085 & 8051.

Simple applications development with programming 8085 & 8051

UNIT I 8085 PROCESSOR 9

Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts.

UNIT II PROGRAMMING OF 8085 PROCESSOR 9

Instruction -format and addressing modes – Assembly language format – Data transfer, data manipulation& control instructions – Programming: Loop structure with counting & Indexing – Look up tability - Subroutine instructions - stack.

UNIT III 8051 MICRO CONTROLLER 9

Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts- Data Transfer, Manipulation, Control Algorithms& I/O instructions, Comparison to Programming concepts with 8085.

UNIT IV PERIPHERAL INTERFACING 9

Study on need, Architecture, configuration and interfacing, with ICs: 8255, 8259, 8254, 8279, - A/D and D/A converters &Interfacing with 8085& 8051.

UNIT V MICRO CONTROLLER PROGRAMMING & APPLICATIONS 9

Simple programming exercises- key board and display interface –Control of servo motor-stepper motor control- Application to automation systems.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to acquire knowledge in Addressing modes & instruction set of 8085 & 8051. Ability to need & use of Interrupt structure 8085 & 8051.

Ability to understand the importance of Interfacing

Ability to explain the architecture of Microprocessor and Microcontroller. Ability to write the assembly language programme.

Ability to develop the Microprocessor and Microcontroller based applications.

TEXT BOOKS:

Sunil Mathur &Jeebananda Panda, "Microprocessor and Microcontrollers", PHI Learning Pvt. Ltd, 2016.

R.S. Gaonkar, 'Microprocessor Architecture Programming and Application', with 8085, Wiley Eastern Ltd., New Delhi, 2013.

Muhammad Ali Mazidi & Janice Gilli Mazidi, R.D.Kinely 'The 8051 Micro Controller and Embedded Systems', PHI Pearson Education, 5th Indian reprint, 2003.

REFERENCES

Krishna Kant, "Microprocessor and Microcontrollers", Eastern Company Edition, Prentice Hall of India, New Delhi, 2007.

B.RAM," Computer Fundamentals Architecture and Organization" New age International Private Limited, Fifth edition, 2017.

Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085,8086,8051,McGraw Hill Edu,2013.

Ajay V.Deshmukh, 'Microcontroller Theory &Applications', McGraw Hill Edu,2016

Douglas V.Hall, 'Microprocessor and Interfacing', McGraw Hill Edu,2016.

EE8552	POWER ELECTRONICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following Topics

Different types of power semiconductor devices and their switching

Operation, characteristics and performance parameters of controlled rectifiers

Operation, switching techniques and basics topologies of DC-DC switching regulators.

Different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.

Operation of AC voltage controller and various configurations.

UNIT I POWER SEMI-CONDUCTOR DEVICES 9

Study of switching devices, SCR, TRIAC, GTO, BJT, MOSFET, IGBT and IGCT- Static characteristics: SCR, MOSFET and IGBT - Triggering and commutation circuit for SCR- Introduction to Driver and snubber circuits.

UNIT II PHASE-CONTROLLED CONVERTERS 9

2-pulse, 3-pulse and 6-pulseconverters– performance parameters –Effect of source inductance— Firing Schemes for converter–Dual converters, Applications-light dimmer, Excitation system, Solar PV systems.

UNIT III DC TO DC CONVERTERS 9

Step-down and step-up chopper-control strategy– Introduction to types of choppers- A, B, C, D and E -Switched mode regulators- Buck, Boost, Buck- Boost regulator, Introduction to Resonant Converters, Applications-Battery operated vehicles.

UNIT IV INVERTERS 9

Single phase and three phase voltage source inverters (both120_0 mode and 180_0 mode)– Voltage& harmonic control--PWM techniques: Multiple PWM, Sinusoidal PWM, modified sinusoidal PWM – Introduction to space vector modulation –Current source inverter, Applications-Induction heating, UPS.

UNIT V AC TO AC CONVERTERS 9 Single phase and Three phase AC voltage controllers–Control strategy- Power Factor Control – Multistage sequence control -single phase and three phase cyclo converters – Introduction to Matrix converters, Applications –welding .

TOTAL : 45 PERIODS

OUTCOMES:

Ability to analyse AC-AC and DC-DC and DC-AC converters.

Ability to choose the converters for real time applications.

TEXT BOOKS:

M.H. Rashid, 'Power Electronics: Circuits, Devices and Applications', Pearson Education, Third Edition, New Delhi, 2004.

P.S.Bimbra "Power Electronics" Khanna Publishers, third Edition, 2003.

Ashfaq Ahmed 'Power Electronics for Technology', Pearson Education, Indian reprint, 2003.

REFERENCES

Joseph Vithayathil,' Power Electronics, Principles and Applications', McGraw Hill Series, 6th Reprint, 2013.

Philip T. Krein, "Elements of Power Electronics" Oxford University Press, 2004 Edition.

L. Umanand, "Power Electronics Essentials and Applications", Wiley, 2010.

Ned Mohan Tore. M. Undel and, William. P. Robbins, 'Power Electronics: Converters, Applications and Design', John Wiley and sons, third edition, 2003.

S.Rama Reddy, 'Fundamentals of Power Electronics', Narosa Publications, 2014.

M.D. Singh and K.B. Khanchandani, "Power Electronics," Mc Graw Hill India, 2013.

JP Agarwal," Power Electronic Systems: Theory and Design" 1e, Pearson Education, 2002.

EE8591 DIGITAL SIGNAL PROCESSING L T P C 2203

OBJECTIVES: To impart knowledge about the following topics:

Signals and systems & their mathematical representation. Discrete time systems.

Transformation techniques & their computation.

Filters and their design for digital implementation.

Programmability digital signal processor & quantization effects.

UNIT I INTRODUCTION 6+6

Classification of systems: Continuous, discrete, linear, causal, stability, dynamic, recursive, time variance; classification of signals: continuous and discrete, energy and power; mathematical representation of signals; spectral density; sampling techniques, quantization, quantization error, Nyquist rate, aliasing effect.

UNIT II DISCRETE TIME SYSTEM ANALYSIS 6+6

Z-transform and its properties, inverse z-transforms; difference equation – Solution by z-transform, application to discrete systems - Stability analysis, frequency response – Convolution – Discrete Time Fourier transform , magnitude and phase representation.

UNIT III DISCRETE FOURIER TRANSFORM & COMPUTATION 6+6

Discrete Fourier Transform- properties, magnitude and phase representation - Computation of DFT using FFT algorithm – DIT &DIF using radix 2 FFT – Butterfly structure.

UNIT IV DESIGN OF DIGITAL FILTERS 6+6

FIR & IIR filter realization – Parallel & cascade forms. FIR design: Windowing Techniques – Need and choice of windows – Linear phase characteristics. Analog filter design – Butterworth and Chebyshev approximations; IIR Filters, digital design using impulse invariant and bilinear transformation Warping, pre warping.

UNIT V DIGITAL SIGNAL PROCESSORS 6+6

Introduction – Architecture – Features – Addressing Formats – Functional modes - Introduction to Commercial DS Processors.

TOTAL : 60 PERIODS

OUTCOMES:

Ability to understand the importance of Fourier transform, digital filters and DS Processors.

Ability to acquire knowledge on Signals and systems & their mathematical representation.

Ability to understand and analyze the discrete time systems.

Ability to analyze the transformation techniques & their computation.

Ability to understand the types of filters and their design for digital implementation.

Ability to acquire knowledge on programmability digital signal processor & quantization effects.

TEXT BOOKS:

J.G. Proakis and D.G. Manolakis, 'Digital Signal Processing Principles,

and Applications', Pearson Education, New Delhi, PHI. 2003.
S.K. Mitra, 'Digital Signal Processing – A Computer Based Approach', McGraw Hill Edu, 2013.
Lonnie C.Ludeman ,"Fundamentals of Digital Signal Processing",Wiley,2013

REFERENCES

Poorna Chandra S, Sasikala. B ,Digital Signal Processing, Vijay Nicole/TMH,2013.
Robert Schilling & Sandra L.Harris, Introduction to Digital Signal Processing using Matlab", Cengage Learning,2014.
B.P.Lathi, 'Principles of Signal Processing and Linear Systems', Oxford University Press, 2010 3. Taan S. ElAli, 'Discrete Systems and Digital Signal Processing with Mat Lab', CRC Press, 2009.
SenM.kuo, woonseng…s.gan, "Digital Signal Processors, Architecture, Implementations & Applications, Pearson,2013
DimitrisG.Manolakis, Vinay K. Ingle, applied Digital Signal Processing,Cambridge,2012

CS8392 OBJECT ORIENTED PROGRAMMING LTPC
300 3

OBJECTIVES:

To understand Object Oriented Programming concepts and basic characteristics of Java To know the principles of packages, inheritance and interfaces
To define exceptions and use I/O streams
To develop a java application with threads and generics
classes To design and build simple Graphical User Interfaces

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 10

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment - Java Source File - Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages - JavaDoc comments.

UNIT II INHERITANCE AND INTERFACES 9

Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes, Array Lists - Strings

UNIT III EXCEPTION HANDLING AND I/O 9

Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files

UNIT IV MULTITHREADING AND GENERIC PROGRAMMING 8 Differences between multi-threading and multitasking, thread life cycle, creating threads,

synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

UNIT V EVENT DRIVEN PROGRAMMING 9

Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes - actions - mouse events - AWT event hierarchy - Introduction to Swing – layout management - Swing Components – Text Fields , Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

Develop Java programs using OOP principles

Develop Java programs with the concepts inheritance and interfaces Build Java applications using exceptions and I/O streams

Develop Java applications with threads and generics classes Develop interactive Java programs using swings

TEXT BOOKS

Herbert Schildt, "Java The complete reference", 8th Edition, McGraw Hill Education, 2011.

Cay S. Horstmann, Gary cornell, "Core Java Volume –I Fundamentals", 9th Edition, Prentice Hall, 2013.

REFERENCES

Paul Deitel, Harvey Deitel, "Java SE 8 for programmers", 3rd Edition, Pearson, 2015.

Steven Holzner, "Java 2 Black book", Dreamtech press, 2011.

Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.

EE8511 CONTROL AND INSTRUMENTATION LABORATORY L T P C

0 0 4 2

OBJECTIVES:

To provide knowledge on analysis and design of control system along with basics of instrumentation.

LIST OF EXPERIMENTS

CONTROLSYSTEMS:

P, PI and PID controllers

Stability Analysis

Modeling of Systems – Machines, Sensors and Transducers

Design of Lag, Lead and Lag-Lead Compensators

Position Control Systems

Synchro-Transmitter- Receiver and Characteristics

Simulation of Control Systems by Mathematical development tools.

INSTRUMENTATION:

Bridge Networks –AC and DC Bridges

Dynamics of Sensors/Transducers

(a) Temperature (b) pressure (c) Displacement (d) Optical (e) Strain (f) Flow

Power and Energy Measurement

Signal Conditioning

Instrumentation Amplifier

Analog – Digital and Digital –Analog converters (ADC and DACs)

Process Simulation

TOTAL: 60 PERIODS

OUTCOMES:

Ability to understand control theory and apply them to electrical engineering problems. Ability to analyze the various types of converters.

Ability to design compensators

Ability to understand the basic concepts of bridge networks.

Ability to the basics of signal conditioning circuits.

Ability to study the simulation packages.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CONTROLSYSTEMS:

PID controller simulation and learner kit – 1 No.
Digital storage Oscilloscope for capturing transience- 1 No

2 Personal Computer with control

system simulation packages - 10 Nos

DC motor –Generator test set-up for evaluation of motor parameters
CRO 30MHz – 1 No.
2MHz Function Generator – 1No.
Position Control Systems Kit (with manual) – 1 No., Tacho Generator Coupling set
AC Synchro transmitter& receiver – 1No.
Sufficient number of Digital multi meters, speed and torque sensors

INSTRUMENTATION:

R, L, C Bridge kit (with manual)
a) Electric heater – 1No.
Thermometer – 1No.Thermistor (silicon type) RTD nickel type – 1No.

30 psi Pressure chamber (complete set) – 1No. Current generator (0 – 20mA)
Air foot pump – 1 No. (with necessary connecting tubes)

LVDT20mm core length movability type – 1No. CRO 30MHz – 1No.

Optical sensor – 1 No. Light source

Strain Gauge Kit with Handy lever beam – 1No.

100gm weights – 10 nos
f) Flow measurement Trainer kit – 1 No.
(1/2 HP Motor, Water tank, Digital Milliammeter, complete set)
Single phase Auto transformer – 1No. Watt-hour meter (energy meter) – 1No.
Ammeter Voltmeter Rheostat Stop watch
Connecting wires (3/20)
IC Transistor kit – 1No.
Instrumentation Amplifier kit-1 No
Analog – Digital and Digital –Analog converters (ADC and DACs)- 1 No

HS8581	PROFESSIONAL COMMUNICATION	LTPC
		0 0 2 1

OBJECTIVES: The course aims to:

Enhance the Employability and Career Skills of students Orient the students towards grooming as a professional Make them Employability Graduates

Develop their confidence and help them attend interviews successfully.

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -— questioning and clarifying –GD strategies-activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress-networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes.

TOTAL : 30 PERIODS

OUTCOMES: At the end of the course Learners will be ability to:

Make effective presentations

Participate confidently in Group Discussions.
Attend job interviews and be successful in them.
Develop adequate Soft Skills required for the workplace

Recommended Software

Open Source Software
Win English

REFERENCES:

Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015
Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.
E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014
S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

CS8383	OBJECT ORIENTED PROGRAMMING LABORATORY	LTPC 0042

COURSE OBJECTIVES

To build software development skills using java programming for real-world applications.
To understand and apply the concepts of classes, packages, interfaces, arraylist, exception handling and file processing.
To develop applications using generic programming and event handling.

List of experiments

Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection(i.e domestic or commercial). Compute the bill amount using the following tariff.

If the type of the EB connection is domestic, calculate the amount to be paid as follows:

First 100 units - Rs. 1 per unit
101-200 units - Rs. 2.50 per unit
201 -500 units - Rs. 4 per unit
> 501 units - Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

First 100 units - Rs. 2 per unit
101-200 units - Rs. 4.50 per unit
201 -500 units - Rs. 6 per unit
> 501 units - Rs. 7 per unit

Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.

Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the

inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.

Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementations.

Write a program to perform string operations using ArrayList. Write functions for the following

- **Append - add at end**
- **Insert – add at particular index**
- **Search**
- **List all string starts with given letter**

Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

Write a Java program to implement user defined exception handling.

Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

Write a java program to find the maximum value from the given type of elements using a generic function.

Design a calculator using event-driven programming paradigm of Java with the following options.

- **Decimal manipulations**
- **Scientific manipulations**

Develop a mini project for any application using Java concepts.

TOTAL : 60 PERIODS

COURSE OUTCOMES

Upon completion of the course, the students will be able to

Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.

Develop and implement Java programs with arraylist, exception handling and multithreading .

Design applications using file processing, generic programming and event handling.

EE8601	SOLID STATE DRIVES	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following Topics

Steady state operation and transient dynamics of a motor load system.

Analyze the operation of the converter/chopper fed dc drive, both qualitatively and quantitatively. Operation and performance of AC motor drives.

Analyze and design the current and speed controllers for a closed loop solid state DC motor drive.

UNIT I DRIVE CHARACTERISTICS 9

Electric drive – Equations governing motor load dynamics – steady state stability – multi quadrant Dynamics: acceleration, deceleration, starting & stopping – typical load torque characteristics – Selection of motor.

UNIT II CONVERTER / CHOPPER FED DC MOTOR DRIVE 9

Steady state analysis of the single and three phase converter fed separately excited DC motor drive– continuous conduction – Time ratio and current limit control – 4 quadrant operation of converter / chopper fed drive-Applications.

UNIT III INDUCTION MOTOR DRIVES 9

Stator voltage control–V/f control– Rotor Resistance control-qualitative treatment of slip power recovery drives-closed loop control—- vector control- Applications.

UNIT IV SYNCHRONOUS MOTOR DRIVES 9

V/f control and self-control of synchronous motor: Margin angle control and power factor control-Three phase voltage/current source fed synchronous motor- Applications.

UNIT V DESIGN OF CONTROLLERS FOR DRIVES 9

Transfer function for DC motor / load and converter – closed loop control with Current and speed feedback–armature voltage control and field weakening mode – Design of controllers; current controller and speed controller- converter selection and characteristics.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand and suggest a converter for solid state drive. Ability to select suitability drive for the given application.

Ability to study about the steady state operation and transient dynamics of a motor load system.

Ability to analyze the operation of the converter/chopper fed dc drive.

Ability to analyze the operation and performance of AC motor drives.

Ability to analyze and design the current and speed controllers for a closed loop solid state DC motor drive.

TEXT BOOKS:

Gopal K.Dubey, Fundamentals of Electrical Drives, Narosa Publishing House, 1992.

Bimal K.Bose. Modern Power Electronics and AC Drives, Pearson Education, 2002.

R.Krishnan, Electric Motor & Drives: Modeling, Analysis and Control, Pearson, 2001.

REFERENCES

Vedam Subramanyam, " Electric Drives Concepts and Applications ", 2e, McGraw Hill, 2016 75

Shaahin Felizadeh, "Electric Machines and Drives", CRC Press (Taylor and Francis Group), 2013.
John Hindmarsh and Alasdain Renfrew, "Electrical Machines and Drives System," Elsevier 2012.
Theodore Wildi, " Electrical Machines ,Drives and power systems ,6th edition, Pearson Education ,2015
N.K. De., P.K. SEN" Electric drives" PHI, 2012.

EE8602 PROTECTION AND SWITCHGEAR L T P C 3003

OBJECTIVES:

To impart knowledge on the following Topics

Causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system.
Characteristics and functions of relays and protection schemes. Apparatus protection, static and numerical relays
Functioning of circuit breaker

UNIT I PROTECTION SCHEMES 9

Principles and need for protective schemes – nature and causes of faults – types of faults – Methods of Grounding - Zones of protection and essential qualities of protection – Protection scheme

UNIT II ELECTROMAGNETIC RELAYS 9

Operating principles of relays - the Universal relay – Torque equation – R-X diagram – Electromagnetic Relays – Over current, Directional, Distance, Differential, Negative sequence and Under frequency relays.

UNIT III APPARATUS PROTECTION 9

Current transformers and Potential transformers and their applications in protection schemes - Protection of transformer, generator, motor, bus bars and transmission line.

UNIT IV STATIC RELAYS AND NUMERICAL PROTECTION 9

Static relays – Phase, Amplitude Comparators – Synthesis of various relays using Static comparators – Block diagram of Numerical relays – Over current protection, transformer differential protection, distant protection of transmission lines.

UNIT V CIRCUIT BREAKERS 9

Physics of arcing phenomenon and arc interruption - DC and AC circuit breaking – re-striking voltage and recovery voltage - rate of rise of recovery voltage - resistance switching - current chopping - interruption of capacitive current - Types of circuit breakers – air blast, air break, oil, SF6, MCBs, MCCBs and vacuum circuit breakers – comparison of different circuit breakers – Rating and selection of Circuit breakers.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand and analyze Electromagnetic and Static Relays. Ability to suggest suitability circuit breaker.
Ability to find the causes of abnormal operating conditions of the apparatus and system.

Ability to analyze the characteristics and functions of relays and protection schemes.

Ability to study about the apparatus protection, static and numerical relays.

Ability to acquire knowledge on functioning of circuit breaker.

TEXT BOOKS:

Sunil S.Rao, 'Switchgear and Protection', Khanna Publishers, New Delhi, 2008.

B.Rabindranath and N.Chander, 'Power System Protection and Switchgear', New Age International (P) Ltd., First Edition 2011.

Arun Ingole, 'Switch Gear and Protection' Pearson Education, 2017.

REFERENCES

BadriRam ,B.H. Vishwakarma, 'Power System Protection and Switchgear', New Age InternationalPvt Ltd Publishers, Second Edition 2011.

Y.G.Paithankar and S.R.Bhide, 'Fundamentals of power system protection', Second Edition,Prentice Hall of India Pvt. Ltd., New Delhi, 2010.

C.L.Wadhwa, 'Electrical Power Systems', 6th Edition, New Age International (P) Ltd., 2010

RavindraP.Singh, 'Switchgear and Power System Protection', PHI Learning Private Ltd., NewDelhi, 2009.

VK Metha," Principles of Power Systems" S. Chand, 2005.

Bhavesh Bhalja, R.P. Maheshwari, Nilesh G. Chotani,'Protection and Switchgear' Oxford University Press, 2011.

EE8691	EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following Topics

Building Blocks of Embedded System

Various Embedded Development Strategies

Bus Communication in processors, Input/output interfacing. Various processor scheduling algorithms.

Basics of Real time operating system and example tutorials to discuss on one real time operating system tool.

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9

Introduction to Embedded Systems –Structural units in Embedded processor , selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging.

UNIT II EMBEDDED NETWORKING 9

Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols RS232 standard – RS422 – RS 485 - CAN Bus -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I^2C) –need for device drivers.

UNIT III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT 9

Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model,

Sequential Program Model, concurrent Model, object oriented Model.

UNIT IV RTOS BASED EMBEDDED SYSTEM DESIGN 9

Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance.

UNIT V EMBEDDED SYSTEM APPLICATION AND DEVELOPMENT 9

Case Study of Washing Machine- Automotive Application- Smart card System Application- ATM machine –Digital camera

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand and analyze Embedded systems.

Ability to suggest an embedded system for a given application.

Ability to operate various Embedded Development Strategies

Ability to study about the bus Communication in processors.

Ability to acquire knowledge on various processor scheduling algorithms.

Ability to understand basics of Real time operating system.

TEXT BOOKS:

Peckol, "Embedded system Design", John Wiley & Sons,2010

Lyla B Das," Embedded Systems-An Integrated Approach", Pearson, 2013

Shibu. K.V, "Introduction to Embedded Systems", 2e, Mc graw Hill, 2017.

REFERENCES

Raj Kamal, 'Embedded System-Architecture, Programming, Design', Mc Graw Hill, 2013.

C.R.Sarma, "Embedded Systems Engineering", University Press (India) Pvt. Ltd, 2013.

Tammy Noergaard, "Embedded Systems Architecture", Elsevier, 2006.

Han-Way Huang, "Embedded system Design Using C8051", Cengage Learning, 2009.

Rajib Mall "Real-Time systems Theory and Practice" Pearson Education, 2007.

EE8661 POWER ELECTRONICS AND DRIVES LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

To provide hands on experience with power electronic converters and testing.

LIST OF EXPERIMENTS

Gate Pulse Generation using R, RC and UJT.

Characteristics of SCR and TRIAC

Characteristics of MOSFET and IGBT

AC to DC half controlled converter

AC to DC fully controlled Converter

Step down and step up MOSFET based choppers

IGBT based single phase PWM inverter

IGBT based three phase PWM inverter
AC Voltage controller
Switched mode power converter.
Simulation of PE circuits (1Φ & 3Φ semi converters, 1Φ & 3Φ full converters, DC-DC converters, AC voltage controllers).
Characteristics of GTO & IGCT.
Characteristics of PMBLDC motor

TOTAL: 60 PERIODS

OUTCOMES:

Ability to practice and understand converter and inverter circuits and apply software for engineering problems.
Ability to experiment about switching characteristics various switches. Ability to analyze about AC to DC converter circuits.
Ability to analyze about DC to AC circuits.
Ability to acquire knowledge on AC to AC converters
Ability to acquire knowledge on simulation software.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Device characteristics(for SCR, MOSFET, TRIAC,GTO,IGCT and IGBT kit with built-in / discrete power supply and meters) - 2 each
SinglephaseSCRbasedhalfcontrolledconverterandfullycontrolledconverteralong with built-in/separate/firing circuit/module and meter – 2 each
MOSFET based step up and step down choppers (Built in/ Discrete) – 1 each
IGBT based single phase PWM inverter module/Discrete Component – 2
IGBT based three phase PWM inverter module/Discrete Component – 2
Switched mode power converter module/Discrete Component – 2
SCR &TRIAC based 1 phase AC controller along with lamp or rheostat load - 2
Cyclo converter kit with firing module – 1
Dual regulated DC power supply with common ground
Cathode ray Oscilloscope –10
Isolation Transformer – 5
Single phase Auto transformer –3
Components (Inductance, Capacitance) 3 set for each
Multimeter – 5
LCR meter – 3
Rheostats of various ranges – 2 sets of 10 value
Work tabilitys – 10
DC and AC meters of required ranges – 20
Component data sheets to be provided

EE8681 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY **L T P C 0 0 4 2**

OBJECTIVES:

To provide training on programming of microprocessors and microcontrollers and understand the interface requirements.

To simulate various microprocessors and microcontrollers using KEIL or Equivalent simulator.

Simple arithmetic operations: addition / subtraction / multiplication / division.

Programming with control instructions:

Ascending / Descending order, Maximum / Minimum of numbers.

Programs using Rotate instructions.

Hex / ASCII / BCD code conversions.

Interface Experiments: with 8085

A/D Interfacing. & D/A Interfacing.

Traffic light controller.

I/O Port / Serial communication

Programming Practices with Simulators/Emulators/open source

Read a key ,interface display

Demonstration of basic instructions with 8051 Micro controller execution, including:

Conditional jumps & looping

Calling subroutines.

Programming I/O Port and timer of 8051

study on interface with A/D & D/A

Study on interface with DC & AC motors

10 Application hardware development using embedded processors.

TOTAL: 60 PERIODS

OUTCOMES:

Ability to understand and apply computing platform and software for engineering problems.

Ability to programming logics for code conversion.

Ability to acquire knowledge on A/D and D/A.

Ability to understand basics of serial communication.

Ability to understand and impart knowledge in DC and AC motor interfacing. Ability to understand basics of software simulators.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Sl.No.	Description of Equipment	Quantity required
1.	8085 Microprocessor Trainer with Power Supply	15
2.	8051 Micro Controller Trainer Kit with power supply	15
3.	8255 Interface boards	5
4.	8251 Interface boards	5

5.	8259 Interface boards	5
6.	8279 Keyboard / Display Interface boards	5
7.	8254 timer/ counters	5
8.	ADC and DAC cards	5
9.	AC & DC motor with Controller s	5
10.	Traffic Light Control Systems	5

EE8611 MINI PROJECT LT P C 0042

OBJECTIVES:

To develop their own innovative prototype of ideas.

To train the students in preparing mini project reports and examination.

The students in a group of 5 to 6 works on a topic approved by the head of the department and prepares a comprehensive mini project report after completing the work to the satisfaction. The progress of the project is evaluated based on a minimum of two reviews. The review committee may be constituted by the Head of the Department. A mini project report is required at the end of the semester. The mini project work is evaluated based on oral presentation and the mini project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 60 PERIODS

OUTCOMES:

On Completion of the mini project work students will be in a position to take up their final year project work and find solution by formulating proper methodology.

EE8701 HIGH VOLTAGE ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

To impart knowledge on the following Topics

Various types of over voltages in power system and protection methods. Generation of over voltages in laboratories.

Measurement of over voltages.

Nature of Breakdown mechanism in solid, liquid and gaseous dielectrics. Testing of power apparatus and insulation coordination

UNIT I OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS 9

Causes of over voltages and its effects on power system – Lightning, switching surges and temporary over voltages, Corona and its effects – Bewley lattice diagram- Protection against over voltages.

UNIT II DIELECTRIC BREAKDOWN 9

Properties of Dielectric materials - Gaseous breakdown in uniform and non-uniform fields – Corona discharges – Vacuum breakdown – Conduction and breakdown in pure and commercial liquids, Maintenance of oil Quality – Breakdown mechanisms in solid and composite dielectrics- Applications of insulating materials in electrical equipments.

UNIT III GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS 9

Generation of High DC voltage: Rectifiers, voltage multipliers, vandigraff generator: generation of high impulse voltage: single and multistage Marx circuits – generation of high AC voltages: cascaded transformers, resonant transformer and tesla coil- generation of switching surges – generation of impulse currents - Triggering and control of impulse generators.

UNIT IV MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS 9

High Resistance with series ammeter – Dividers, Resistance, Capacitance and Mixed dividers - Peak Voltmeter, Generating Voltmeters - Capacitance Voltage Transformers, Electrostatic Voltmeters – Sphere Gaps - High current shunts- Digital techniques in high voltage measurement.

UNIT V HIGH VOLTAGE TESTING & INSULATION COORDINATION 9

High voltage testing of electrical power apparatus as per International and Indian standards – Power frequency, impulse voltage and DC testing of Insulators, circuit breakers, bushing, isolators and transformers- Insulation Coordination& testing of cables.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand Transients in power system.

Ability to understand Generation and measurement of high voltage. Ability to understand High voltage testing.

Ability to understand various types of over voltages in power system. Ability to measure over voltages.

Ability to test power apparatus and insulation coordination

TEXT BOOKS:

S.Naidu and V. Kamaraju, 'High Voltage Engineering', Tata McGraw Hill, Fifth Edition, 2013.

E. Kuffel and W.S. Zaengl, J.Kuffel, 'High voltage Engineering fundamentals', Newnes Second Edition Elsevier , New Delhi, 2005.

C.L. Wadhwa, 'High voltage Engineering', New Age International Publishers, Third Edition, 2010.

REFERENCES

L.L. Alston, 'High Voltage Technology', Oxford University Press, First Indian Edition, 2011.

Mazen Abdel – Salam, Hussein Anis, Ahdab A-Morshedy, Roshday Radwan, High Voltage Engineering – Theory &Practice, Second Edition Marcel Dekker, Inc., 2010.

Subir Ray,' An Introduction to High Voltage Engineering' PHI Learning Private Limited, New Delhi, Second Edition, 2013.

EE8702	POWER SYSTEM OPERATION AND CONTROL	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following topics

Significance of power system operation and control.

Real power-frequency interaction and design of power-frequency controller.

Reactive power-voltage interaction and the control actions to be implemented for maintaining the voltage profile against varying system load.

Economic operation of power system.

SCADA and its application for real time operation and control of power systems

UNIT I PRELIMINARIES ON POWER SYSTEM OPERATION AND CONTROL 9

Power scenario in Indian grid – National and Regional load dispatching centers – requirements of good power system - necessity of voltage and frequency regulation - real power vs frequency and reactive power vs voltage control loops - system load variation, load curves and basic concepts of load dispatching - load forecasting - Basics of speed governing mechanisms and modeling - speed load characteristics - regulation of two generators in parallel.

UNIT II REAL POWER - FREQUENCY CONTROL 9

Load Frequency Control (LFC) of single area system-static and dynamic analysis of uncontrolled and controlled cases - LFC of two area system - tie line modeling - block diagram representation of two area system - static and dynamic analysis - tie line with frequency bias control – state variability model - integration of economic dispatch control with LFC.

UNIT III REACTIVE POWER – VOLTAGE CONTROL 9

Generation and absorption of reactive power - basics of reactive power control – Automatic Voltage Regulator (AVR) – brushless AC excitation system – block diagram representation of AVR loop - static and dynamic analysis – stability compensation – voltage drop in transmission line - methods of reactive power injection - tap changing transformer, SVC (TCR + TSC) and STATCOM for voltage control.

UNIT IV ECONOMIC OPERATION OF POWER SYSTEM 9

Statement of economic dispatch problem - input and output characteristics of thermal plant - incremental cost curve - optimal operation of thermal units without and with transmission losses (no derivation of transmission loss coefficients) - base point and participation factors method - statement of unit commitment (UC) problem - constraints on UC problem - solution of UC problem using priority list – special aspects of short term and long term hydrothermal problems.

UNIT V COMPUTER CONTROL OF POWER SYSTEMS 9

Need of computer control of power systems-concept of energy control centers and functions – PMU - system monitoring, data acquisition and controls - System hardware configurations - SCADA and EMS functions - state estimation problem – measurements and errors - weighted least square estimation - various operating states - state transition diagram.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand the day-to-day operation of electric power system.

Ability to analyze the control actions to be implemented on the system to meet the minute-to-minute variation of system demand.

Ability to understand the significance of power system operation and control. Ability to acquire knowledge on real power-frequency interaction.

Ability to understand the reactive power-voltage interaction.

Ability to design SCADA and its application for real time operation.

TEXT BOOKS:

Olle.I.Elgerd, 'Electric Energy Systems theory - An introduction', McGraw Hill Education Pvt. Ltd., New Delhi, 34th reprint, 2010.

Allen. J. Wood and Bruce F. Wollen berg, 'Power Generation, Operation and Control', John Wiley & Sons, Inc., 2016.

Abhijit Chakrabarti and Sunita Halder, 'Power System Analysis Operation and Control', PHI learning Pvt. Ltd., New Delhi, Third Edition, 2010.

REFERENCES

Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw-Hill Education, Second Edition, 2008.

Hadi Saadat, 'Power System Analysis', McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.

Kundur P., 'Power System Stability and Control, McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.

EE8703 RENEWABLE ENERGY SYSTEMS L T P C

3 0 0 3

OBJECTIVES:

To impart knowledge on the following Topics

Awareness about renewable Energy Sources and technologies.

Adequate inputs on a variety of issues in harnessing renewable Energy.

Recognize current and possible future role of renewable energy sources.

UNIT I RENEWABLE ENERGY (RE) SOURCES 9

Environmental consequences of fossil fuel use, Importance of renewable sources of energy, Sustainable Design and development, Types of RE sources, Limitations of RE sources, Present Indian and international energy scenario of conventional and RE sources.

UNIT II WIND ENERGY 9

Power in the Wind – Types of Wind Power Plants(WPPs)–Components of WPPs- Working of WPPs- Siting of WPPs-Grid integration issues of WPPs.

UNIT III SOLAR PV AND THERMAL SYSTEMS 9 Solar Radiation, Radiation Measurement, Solar Thermal Power Plant, Central Receiver
Power Plants, Solar Ponds.- Thermal Energy storage system with PCM- Solar Photovoltaic systems : Basic Principle of SPV conversion – Types of PV Systems- Types of Solar Cells, Photovoltaic cell concepts: Cell, module, array ,PV Module I-V Characteristics, Efficiency & Quality of the Cell, series and parallel connections, maximum power point tracking, Applications.

UNIT IV BIOMASS ENERGY 9

Introduction-Bio mass resources –Energy from Bio mass: conversion processes-Biomass Cogeneration-Environmental Benefits. Geothermal Energy: Basics, Direct Use, Geothermal Electricity. Mini/micro hydro power: Classification of hydropower schemes, Classification of water turbine, Turbine theory, Essential components of hydroelectric system.

UNIT V OTHER ENERGY SOURCES 9

Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems. Wave Energy: Energy from waves, wave power devices. Ocean Thermal Energy Conversion (OTEC)- Hydrogen Production and Storage- Fuel cell : Principle of working- various types - construction and applications. Energy Storage System- Hybrid Energy Systems.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to create awareness about renewable Energy Sources and technologies.

Ability to get adequate inputs on a variety of issues in harnessing renewable Energy.

Ability to recognize current and possible future role of renewable energy sources.

Ability to explain the various renewable energy resources and technologies and their applications.

Ability to understand basics about biomass energy.

Ability to acquire knowledge about solar energy.

TEXT BOOKS:

Joshua Earnest, Tore Wizeliu, 'Wind Power Plants and Project Development', PHI Learning Pvt.Ltd, New Delhi, 2011.

D.P.Kothari, K.C Singal, Rakesh Ranjan "Renewable Energy Sources and Emerging Technologies", PHI Learning Pvt.Ltd, New Delhi, 2013.

Scott Grinnell, "Renewable Energy & Sustainable Design", CENGAGE Learning, USA, 2016.

REFERENCES

A.K.Mukerjee and Nivedita Thakur," Photovoltaic Systems: Analysis and Design", PHI Learning Private Limited, New Delhi, 2011

Richard A. Dunlap," Sustainable Energy" Cengage Learning India Private Limited, Delhi, 2015.

Chetan Singh Solanki, " Solar Photovoltaics : Fundamentals, Technologies and Applications", PHI Learning Private Limited, New Delhi, 2011

Bradley A. Striebig,Adebayo A.Ogundipe and Maria Papadakis," Engineering Applications in Sustainable Design and Development", Cengage Learning India Private Limited, Delhi, 2016.

Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.

Shobh Nath Singh, 'Non-conventional Energy resources' Pearson Education ,2015.

EE8711	POWER SYSTEM SIMULATION LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

To provide better understanding of power system analysis through digital simulation.

LIST OF EXPERIMENTS

1. **Computation of Transmission Line Parameters**
2. **Formation of Bus Admittance and Impedance Matrices and Solution of Networks**
3. **Power Flow Analysis using Gauss-Seidel Method**
4. **Power Flow Analysis using Newton Raphson Method**
5. **Symmetric and unsymmetrical fault analysis**
6. **Transient stability analysis of SMIB System**
7. **Economic Dispatch in Power Systems**
8. **Load – Frequency Dynamics of Single- Area and Two-Area Power Systems**
9. **State estimation: Weighted least square estimation**
10. **Electromagnetic Transients in Power Systems : Transmission Line Energization**

TOTAL: 60 PERIODS

OUTCOMES:

Ability to

Ability to understand power system planning and operational studies.

Ability to acquire knowledge on Formation of Bus Admittance and Impedance Matrices and Solution of Networks.

Ability to analyze the power flow using GS and NR method

Ability to find Symmetric and Unsymmetrical fault

Ability to understand the economic dispatch.

Ability to analyze the electromagnetic transients.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Personal computers (Intel i3, 80GB, 2GBRAM) – 30 nos
Printer laser- 1 No.
Dot matrix- 1 No.
Server (Intel i5, 80GB, 2GBRAM) (High Speed Processor) – 1 No.
Software: any power system simulation software with 5 user license
Compliers: C, C++, VB, VC++ - 30 users

EE8712 **RENEWABLE ENERGY SYSTEMS** **L T P C**

LABORATORY **0 0 4 2**

OBJECTIVES:

To train the students in Renewable Energy Sources and technologies.

To provide adequate inputs on a variety of issues in harnessing Renewable Energy.

To recognize current and possible future role of Renewable energy sources.

LIST OF EXPERIMENTS

Simulation study on Solar PV Energy System.

Experiment on "VI-Characteristics and Efficiency of 1kWp Solar PV System".

Experiment on "Shadowing effect & diode based solution in 1kWp Solar PV System".

4 Experiment on Performance assessment of Grid connected and Standalone 1kWp Solar Power System.

Simulation study on Wind Energy Generator.

Experiment on Performance assessment of micro Wind Energy Generator.

Simulation study on Hybrid (Solar-Wind) Power System.

Experiment on Performance Assessment of Hybrid (Solar-Wind) Power System.

Simulation study on Hydel Power.

Experiment on Performance Assessment of 100W Fuel Cell.

Simulation study on Intelligent Controllers for Hybrid Systems.

TOTAL: 60 PERIODS

OUTCOMES:

Ability to understand and analyze Renewable energy systems.

Ability to train the students in Renewable Energy Sources and technologies.

Ability to provide adequate inputs on a variety of issues in harnessing Renewable Energy.

Ability to simulate the various Renewable energy sources.

Ability to recognize current and possible future role of Renewable energy sources. Ability to understand basics of Intelligent Controllers.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

S.No	Name of the equipments / Components	Quantity Required	Remarks
1.	Personal computers (Intel i3, 80GB, 2GBRAM)	15	-
2.	CRO	9	30MHz
3.	Digital Multimeter	10	Digital
4.	PV panels - 100W, 24V	1	
5.	Battery storage system with charge and discharge control 40Ah	1	
6.	PV Emulator	1	
7.	Micro Wind Energy Generator module	1	

Consumabilitys (Minimum of 5 Nos. each)			
8.	Potentiometer	5	-
9.	Step-down transformer	5	230V/12-0-12V
10	Component data sheets to be provided		

EE8811 PROJECT WORK L T P C 002010

OBJECTIVES:

To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 300 PERIODS

OUTCOMES:

- **On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.**

IC8651 ADVANCED CONTROL SYSTEM LTPC

2 2 0 3

OBJECTIVES:

To provide knowledge on design state feedback control and state observer.
To provide knowledge in phase plane analysis.
To give basic knowledge in describing function analysis.
To study the design of optimal controller.
To study the design of optimal estimator including Kalman Filter

UNIT I STATE VARIABLE ANALYSIS 6+6

Introduction- concepts of state variables and state model-State model for linear continuous time systems, Diagonalisation- solution of state equations- Concepts of controllability and observability.

UNIT II STATE VARIABLE DESIGN 6+6

Introduction to state model: Effect of state feedback - Pole placement design: Necessary and sufficient condition for arbitrary pole placement, State regulator design Design of state observers-Separation principle- Design of servo systems: State feedback with integral control.

UNIT III SAMPLED DATA ANALYSIS **6+6**

Introduction spectrum analysis of sampling process signal reconstruction difference equations The Z transform function, the inverse Z transform function, response of Linear discrete system, the Z transform analysis of sampled data control systems, response between sampling instants, the Z and S domain relationship. Stability analysis and compensation techniques.

UNIT IV NON LINEAR SYSTEMS **6+6**

Introduction, common physical nonlinearites, The phase plane method: concepts, singular points, stability of non linear systems, construction of phase trajectories system analysis by phase plane method. The describing function method, stability analysis by describing function method, Jump resonance.

UNIT V OPTIMAL CONTROL **6+6**

Introduction: Classical control and optimization, formulation of optimal control problem, Typical optimal control performance measures - Optimal state regulator design: Lyapunov equation, Matrix Riccati equation - LQR steady state optimal control – Application examples.

TOTAL: 60 PERIODS

OUTCOMES:

Able to design state feedback controller and state observer.
Able to understand and analyse linear and nonlinear systems using phase plane method.
Able to understand and analyse nonlinear systems using describing function method.
Able to understand and design optimal controller.
Able to understand optimal estimator including Kalman Filter.
Ability to apply advanced control strategies to practical engineering problems.

TEXT BOOKS:

M.Gopal, "Digital Control and State Variable Methods", 4th edition, Mc Graw Hill India, 2012
K. Ogata, 'Modern Control Engineering', 5th Edition, Pearson, 2012.
K. P. Mohandas, "Modern Control Engineering", Sanguine Technical Publishers, 2006.

REFERENCES:

M.Gopal, Modern Control System Theory, 3rd edition, New Age International Publishers, 2014.
William S Levine, "Control System Fundamentals," The Control Handbook, CRC Press, Tayler and Francies Group, 2011.
Ashish Tewari, 'Modern Control Design with Matlab and Simulink', John Wiley, New Delhi, 2002.
T. Glad and L. Ljung,, "Control Theory –Multivariable and Non-Linear Methods", Taylor & Francis, 2002.
D.S.Naidu, "Optimal Control Systems" First Indian Reprint, CRC Press, 2009.

EE8001	VISUAL LANGUAGES AND APPLICATIONS	L	T	P	C
		3	0	0	3

OBJECTIVES: To impart knowledge about the following topics:

To study about the concepts of windows programming models, MFC applications, drawing with the GDI, getting inputs from Mouse and the Keyboard.

To study the concepts of Menu basics, menu magic and classic controls of the windows programming using VC++.

To study the concept of Document/View Architecture with single & multiple document

interface, toolbars, status bars and File I/O Serialization.

To study about the integrated development programming event driven programming, variabilitys, constants, procedures and basic ActiveX controls in visual basic.

To understand the database and the database management system, visual data manager, data bound controls and ADO controls in VB.

UNIT I FUNDAMENTALS OF WINDOWS AND MFC 9

Messages - Windows programming - SDK style - Hungarian notation and windows data types - SDK programming in perspective. The benefits of C++ and MFC - MFC design philosophy – Document / View architecture - MFC class hierarchy - AFX functions. Application object - Frame window object - Message map. Drawing the lines – Curves – Ellipse – Polygons and other shapes. GDI pens – Brushes - GDI fonts - Deleting GDI objects and deselecting GDI objects. Getting input from the mouse: Client & Non-client - Area mouse messages - Mouse wheel - Cursor. Getting input from the keyboard: Input focus - Keystroke messages - Virtual key codes - Character & dead key messages.

UNIT II RESOURCES AND CONTROLS 9

Creating a menu – Loading and displaying a menu – Responding to menu commands – Command ranges - Updating the items in menu, update ranges – Keyboard accelerators. Creating menus programmatically - Modifying menus programmatically - The system menu - Owner draw menus – Cascading menus - Context menus. The C button class – C list box class – C static class - The font view application – C edit class – C combo box class – C scrollbar class. Model dialog boxes – Modeless dialog boxes.

UNIT III DOCUMENT / VIEW ARCHITECTURE 9

The in existence function revisited – Document object – View object – Frame window object – Dynamic object creation. SDI document template - Command routing. Synchronizing multiple views of a document – Mid squares application – Supporting multiple document types – Alternatives to MDI. Splitter Windows: Dynamic splitter window – Static splitter windows. Creating & initializing a toolbar - Controlling the toolbar's visibility – Creating & initializing a status bar - Creating custom status bar panes – Status bar support in appwizard. Opening, closing and creating the files - Reading & Writing – C file derivatives – Serialization basics - Writing serializability classes.

UNIT IV FUNDAMENTALS OF VISUAL BASIC 9

Menu bar – Tool bar – Project explorer – Toolbox – Properties window – Form designer – Form layout – Intermediate window. Designing the user interface: Aligning the controls – Running the application – Visual development and event driven programming.

Variabilitys: Declaration – Types – Converting variability types – User defined data types - Lifetime of a variability. Constants - Arrays – Types of arrays. Procedures: Subroutines – Functions – Calling procedures. Text box controls – List box & Combo box controls – Scroll bar and slider controls – File controls.

UNIT V DATABASE PROGRAMMING WITH VB 9

Record sets – Data control – Data control properties, methods. Visual data manager: Specifying indices with the visual data manager – Entering data with the visual data manager. Data bound list control – Data bound combo box – Data bound grid control. Mapping databases: Database object – Tability def object, Query def object. Programming the active database objects – ADO object model – Establishing a connection - Executing SQL statements – Cursor types and locking mechanism – Manipulating the record set

object – Simple record editing and updating.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand and apply computing platform and software for engineering problems

Ability to study about the concepts of windows programming models.

Ability to study the concepts of Menu basics, menu magic and classic controls.

Ability to study the concept of Document/View Architecture with single & multiple document interface.

Ability to study about the integrated development programming event driven programming.

Ability to understand the database and the database management system.

TEXT BOOKS:

Jeff Prosise, 'Programming Windows With MFC', Second Edition, WP Publishers & Distributors (P) Ltd, Reprinted, 2002.

Evangelos Petroutsos, 'Mastering Visual Basic 6.0', BPB Publications, 2002.

REFERENCES

Herbert Schildt, 'MFC Programming From the Ground Up', Second Edition, McGraw Hill, reprinted, 2002.

John Paul Muller, 'Visual C++ 6 From the Ground Up Second Edition', McGraw Hill, Reprinted, 2002.

Curtis Smith & Micheal Amundsen, 'Teach Yourself Database Programming with Visual Basic 6 in 21 days', Techmedia Pub, 1999.

EE8002 DESIGN OF ELECTRICAL APPARATUS L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

Magnetic circuit parameters and thermal rating of various types of electrical machines. Armature and field systems for D.C. machines.

Core, yoke, windings and cooling systems of transformers.

Design of stator and rotor of induction machines and synchronous machines. The importance of computer aided design method.

UNIT I DESIGN OF FIELD SYSTEM AND ARMATURE 9

Major considerations in Electrical Machine Design – Materials for Electrical apparatus – Design of Magnetic circuits – Magnetising current – Flux leakage – Leakage in Armature. Design of lap winding and wave winding.

UNIT II DESIGN OF TRANSFORMERS 9

Construction - KVA output for single and three phase transformers – Overall dimensions – design of yoke, core and winding for core and shell type transformers – Estimation of No load current – Temperature rise in Transformers – Design of Tank and cooling tubes of Transformers. Computer program: Complete Design of single phase core transformer

UNIT III DESIGN OF DC MACHINES 9

Construction - Output Equations – Main Dimensions – Choice of specific loadings – Selection of number of poles – Design of Armature – Design of commutator and brushes – design of field Computer program: Design of Armature main dimensions

UNIT IV DESIGN OF INDUCTION MOTORS 9

Construction - Output equation of Induction motor – Main dimensions – choice of specific loadings – Design of squirrel cage rotor and wound rotor –Magnetic leakage calculations – Operating characteristics : Magnetizing current - Short circuit current – Circle diagram - Computer program: Design of slip-ring rotor

UNIT V DESIGN OF SYNCHRONOUS MACHINES 9

Output equations – choice of specific loadings – Design of salient pole machines – Short circuit ratio – Armature design – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field MMF – Design of field winding – Design of turbo alternators -Computer program: Design of Stator main dimensions-Brushless DC Machines

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand basics of design considerations for rotating and static electrical machines

Ability to design of field system for its application.

Ability to design sing and three phase transformer.

Ability to design armature and field of DC machines.

Ability to design stator and rotor of induction motor.

Ability to design and analyze synchronous machines.

TEXT BOOKS:

Sawhney, A.K., 'A Course in Electrical Machine Design', Dhanpat Rai& Sons, New Delhi, Fifth Edition, 1984.

M V Deshpande 'Design and Testing of Electrical Machines' PHI learning Pvt Lt, 2011.

Sen, S.K., 'Principles of Electrical Machine Designs with Computer Programmes', Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, Second Edition, 2009.

REFERENCES

A.Shanmugasundaram, G.Gangadharan, R.Palani 'Electrical Machine Design Data Book', New Age International Pvt. Ltd., Reprint 2007.

'Electrical Machine Design', Balbir Singh, Vikas Publishing House Private Limited, 1981.

V Rajini, V.S Nagarajan, 'Electrical Machine Design', Pearson, 2017.

K.M.Vishnumurthy 'Computer aided design of electrical machines' B S Publications,2008

EE8003 POWER SYSTEM STABILITY L T P C 3003

OBJECTIVES:

To understand the fundamental concepts of stability of power systems and its classification.
To expose the students to dynamic behaviour of the power system for small and large disturbances.
To understand and enhance the stability of power systems.

UNIT I INTRODUCTION TO STABILITY 9

Fundamental concepts - Stability and energy of a system - Power System Stability: Definition, Causes, Nature and Effects of disturbances, Classification of stability, Modelling of electrical components - Basic assumptions made in stability studies-Modelling of Synchronous machine for stability studies(classical model) - Rotor dynamics and the swing equation.

UNIT II SMALL-SIGNAL STABILITY 9

Basic concepts and definitions – State space representation, Physical Interpretation of small–signal stability, Eigen properties of the state matrix: Eigenvalues and eigenvectors, modal matrices, eigenvalue and stability, mode shape and participation factor. Small– signal stability analysis of a Single-Machine Infinite Bus (SMIB) Configuration with numerical example.

UNIT III TRANSIENT STABILITY 9

Review of numerical integration methods: modified Euler and Fourth Order Runge-Kutta methods, Numerical stability,. Interfacing of Synchronous machine (classical machine) model to the transient stability algorithm (TSA) with partitioned – explicit approaches-Application of TSA to SMIB system.

UNIT IVVOLTAGE STABILITY 9

Factors affecting voltage stability- Classification of Voltage stability-Transmission system characteristics- Generator characteristics- Load characteristics-Characteristics of reactive power compensating Devices- Voltage collapse.

UNIT V ENHANCEMENT OF SMALL-SIGNAL STABILITY AND TRANSIENT STABILITY 9

Power System Stabilizer –. Principle behind transient stability enhancement methods: high-speed fault clearing, regulated shunt compensation, dynamic braking, reactor switching, independent pole- operation of circuit-breakers, single-pole switching, fast-valving, high-speed excitation systems.

TOTAL : 45 PERIODS

OUTCOMES:

Learners will attain knowledge about the stability of power system
Learners will have knowledge on small-signal stability, transient stability and voltage stability.
Learners will be able to understand the dynamic behaviour of synchronous generator for different disturbances.

Learners will be able to understand the various methods to enhance the stability of a power system.

TEXT BOOKS:

Power system stability and control ,P. Kundur ; edited by Neal J. Balu, Mark G. Lauby,
McGraw-Hill, 1994.
R.Ramnujam," Power System Dynamics Analysis and Simulation, PHI Learning Private Limited, New Delhi, 2009
T.V. Cutsem and C.Vournas, "Voltage Stability of Electric Power Systems", Kluwer publishers, 1998.

REFERENCES

Peter W., Saucer, Pai M.A., "Power System Dynamics and Stability, Pearson Education (Singapore), 9th Edition, 2007.
EW. Kimbark., "Power System Stability", John Wiley & Sons Limited, New Jersey, 2013.
SB. Crary., "Power System Stability", John Wiley & Sons Limited, New Jersey, 1955.
K.N. Shubhanga,"Power System Analysis" Pearson, 2017.
Power systems dynamics: Stability and control / K.R. Padiyar, BS Publications, 2008
Power system control and Stability P.M. Anderson, A.A. Foud, Iowa State University Press, 1977.

EE8004 MODERN POWER CONVERTERS L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

Switched mode power supplies Matrix Converter

Soft switched converters

UNIT I SWITCHED MODE POWER SUPPLIES (SMPS) 9

DC Power supplies and Classification; Switched mode dc power supplies - with and without isolation, single and multiple outputs; Closed loop control and regulation; Design examples on converter and closed loop performance.

UNIT II AC-DC CONVERTERS 9

Switched mode AC-DC converters. synchronous rectification - single and three phase topologies - switching techniques - high input power factor . reduced input current harmonic distortion. improved efficiency. with and without input-output isolation. performance indices design examples

UNIT III DC-AC CONVERTERS 9

Multi- level Inversion - concept, classification of multilevel inverters, Principle of operation, main features and analysis of Diode clamped, Flying capacitor and cascaded multilevel inverters; Modulation schemes.

UNIT IV AC-AC CONVERTERS WITH AND WITHOUT DC LINK 9

Matrix converters. Basic topology of matrix converter; Commutation – current path; Modulation techniques - scalar modulation, indirect modulation; Matrix converter as only

AC-DC converter; AC-AC converter with DC link - topologies and operation - with and without resonance link - converter with dc link converter; Performance comparison with matrix converter with DC link converters.

UNIT V SOFT-SWITCHING POWER CONVERTERS 9

Soft switching techniques. ZVS, ZCS, quasi resonance operation; Performance comparison hard switched and soft switched converters.AC-DC converter, DC-DC converter, DC-AC converter.; Resonant DC power supplies .

TOTAL : 45 PERIODS

OUTCOMES:

Ability to suggest converters for AC-DC conversion and SMPS

TEXT BOOKS:

Power Electronics Handbook, M.H.Rashid, Academic press, New york, 2000.

Advanced DC/DC Converters, Fang Lin Luo and Fang Lin Luo, CRC Press, NewYork, 2004.

Control in Power Electronics- Selected Problem, Marian P.Kazmierkowski, R.Krishnan and Frede Blaabjerg, Academic Press (Elsevier Science), 2002. REFERENCES

Power Electronic Circuits, Issa Batarseh, John Wiley and Sons, Inc.2004

Power Electronics for Modern Wind Turbines, Frede Blaabjerg and Zhe Chen, Morgan & Claypool Publishers series, United States of America, 2006.

Krein Philip T, Elements of Power Electronics,Oxford University press, 2008

Agarwal ,Power Electronics: Converters, Applications, and Design, 3rd edition, Jai P, Prentice Hall,2000

L. Umanand, Power Electronics: Essentials & Applications, John Wiley and Sons, 2009.

GE8075 INTELLECTUAL PROPERTY RIGHTS L T P C

3 0 0 3

OBJECTIVE:

To give an idea about IPR, registration and its enforcement.

UNIT I INTRODUCTION 9

Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II REGISTRATION OF IPRs 10

Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad

UNIT III AGREEMENTS AND LEGISLATIONS 10

International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT IV DIGITAL PRODUCTS AND LAW 9

Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection – Unfair Competition – Meaning and Relationship between Unfair Competition and IP Laws – Case Studies.

UNIT V ENFORCEMENT OF IPRs 7

Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

TOTAL:45 PERIODS

OUTCOME:

Ability to manage Intellectual Property portfolio to enhance the value of the firm.

TEXT BOOKS

V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012

S. V. Satakar, "Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002

REFERENCES:

Deborah E. Bouchoux, "Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets", Cengage Learning, Third Edition, 2012.

Prabuddha Ganguli,"Intellectual Property Rights: Unleashing the Knowledge Economy", McGraw Hill Education, 2011.

Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

RO8591 PRINCIPLES OF ROBOTICS LTPC

3 003

OBJECTIVES:

To introduce the functional elements of Robotics

To impart knowledge on the direct and inverse kinematics

To introduce the manipulator differential motion and control

To educate on various path planning techniques

To introduce the dynamics and control of manipulators

UNIT I BASIC CONCEPTS 9

Brief history- Types of Robot–Technology-Robot classifications and specifications-Design and controlissues- Various manipulators – Sensors - work cell - Programming languages.

UNIT II DIRECT AND INVERSE KINEMATICS 9

Mathematical representation of Robots - Position and orientation – Homogeneous transformation-Various joints- Representation using the Denavit Hattenberg parameters -Degrees of freedom-Direct kinematics-Inverse kinematics- SCARA robots- Solvability – Solution methods-Closed form solution.

UNIT III MANIPULATOR DIFFERENTIAL MOTION AND STATICS 9

Linear and angular velocities-Manipulator Jacobian-Prismatic and rotary joints–Inverse -Wrist and arm singularity - Static analysis - Force and moment Balance.

UNIT IV PATH PLANNING 9

Definition- Joint space technique-Use of p-degree polynomial-Cubic polynomial-Cartesian space technique - Parametric descriptions - Straight line and circular paths - Position and orientation planning.

UNIT V DYNAMICS AND CONTROL 9

Lagrangian mechanics -2DOF Manipulator-Lagrange Euler formulation-Dynamic model –Manipulator control problem-Linear control schemes-PID control scheme-Force control of robotic manipulator.

TOTAL: 45 PERIODS

OUTCOMES:

Ability to understand basic concept of robotics.

To analyze Instrumentation systems and their applications to various

To know about the differential motion add statics in robotics

To know about the various path planning techniques.

To know about the dynamics and control in robotics industries.

TEXT BOOKS:

R.K.Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi,4th Reprint, 2005.

JohnJ.Craig ,Introduction to Robotics Mechanics and Control, Third edition, Pearson Education, 2009.

M.P.Groover, M.Weiss, R.N. Nageland N. G.Odrej, Industrial Robotics, McGraw-Hill Singapore, 1996.

REFERENCES:

Ashitava Ghoshal, Robotics-Fundamental Concepts and Analysis', Oxford University Press, Sixth impression, 2010.

K. K.Appu Kuttan, Robotics, I K International, 2007.

Edwin Wise, Applied Robotics, Cengage Learning, 2003.

R.D.Klafter,T.A.Chimielewski and M.Negin, Robotic Engineering–An Integrated Approach, Prentice Hall of India, New Delhi, 1994.

B.K.Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers,Chennai, 1998.

S.Ghoshal, " Embedded Systems & Robotics" – Projects using the 8051 Microcontroller", Cengage Learning, 2009.

EE8005	SPECIAL ELECTRICAL MACHINES	L	T	P	C
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OBJECTIVES:

To impart knowledge on the following Topics

Construction, principle of operation, control and performance of stepping motors.

Construction, principle of operation, control and performance of switched reluctance motors.

Construction, principle of operation, control and performance of permanent magnet brushless D.C. motors.

Construction, principle of operation and performance of permanent magnet synchronous motors.

Construction, principle of operation and performance of other special Machines.

UNIT I STEPPER MOTORS 9

Constructional features –Principle of operation –Types – Torque predictions – Linear Analysis – Characteristics – Drive circuits – Closed loop control – Concept of lead angle - Applications.

UNIT II SWITCHED RELUCTANCE MOTORS (SRM) 9

Constructional features –Principle of operation- Torque prediction–Characteristics Steady state performance prediction – Analytical Method – Power controllers – Control of SRM drive- Sensor less operation of SRM – Applications.

UNIT III PERMANENT MAGNET BRUSHLESS D.C. MOTORS 9

Fundamentals of Permanent Magnets- Types- Principle of operation- Magnetic circuit analysis- EMF and Torque equations- Power Converter Circuits and their controllers - Characteristics and control- Applications.

UNIT IV PERMANENT MAGNET SYNCHRONOUS MOTORS (PMSM) 9

Constructional features -Principle of operation – EMF and Torque equations - Sine wave motor with practical windings - Phasor diagram - Power controllers – performance characteristics -Digital controllers – Applications.

UNIT V OTHER SPECIAL MACHINES 9

Constructional features – Principle of operation and Characteristics of Hysteresis motor-Synchronous Reluctance Motor–Linear Induction motor-Repulsion motor- Applications.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to analyze and design controllers for special Electrical Machines.

Ability to acquire the knowledge on construction and operation of stepper motor.

Ability to acquire the knowledge on construction and operation of stepper switched reluctance motors.

Ability to construction, principle of operation, switched reluctance motors.

Ability to acquire the knowledge on construction and operation of permanent magnet brushless D.C. motors.

Ability to acquire the knowledge on construction and operation of permanent magnet synchronous motors.

Ability to select a special Machine for a particular application.

TEXT BOOKS:

K.Venkataratnam, 'Special Electrical Machines', Universities Press (India) Private Limited, 2008.

T. Kenjo, 'Stepping Motors and Their Microprocessor Controls', Clarendon Press London, 1984

E.G. Janardanan, 'Special electrical machines', PHI learning Private Limited, Delhi, 2014.

REFERENCES

R.Krishnan, 'Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application', CRC Press, New York, 2001.

T. Kenjo and S. Nagamori, 'Permanent Magnet and Brushless DC Motors', Clarendon Press, London, 1988.

T.J.E.Miller,'Brushless Permanent-Magnet and Reluctance Motor Drives', Oxford University Press, 1989.

R.Srinivasan, 'Special Electrical Machines', Lakshmi Publications, 2013.

EE8006 POWER QUALITY L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

Causes & Mitigation techniques of various PQ events. Various Active & Passive power filters.

UNIT I INTRODUCTION TO POWER QUALITY 9

Terms and definitions & Sources – Overloading, under voltage, over voltage - Concepts of transients - Short duration variations such as interruption - Long duration variation such as sustained interruption - Sags and swells - Voltage sag - Voltage swell - Voltage imbalance – Voltage fluctuations - Power frequency variations - International standards of power quality – Computer Business Equipment Manufacturers Associations (CBEMA) curve

UNIT II VOLTAGE SAG AND SWELL 9

Estimating voltage sag performance - Thevenin's equivalent source - Analysis and calculation of various faulted condition - Estimation of the sag severity - Mitigation of voltage sag, Static transfer switches and fast transfer switches. - Capacitor switching – Lightning - Ferro resonance - Mitigation of voltage swell.

UNIT III HARMONICS 9

Harmonic sources from commercial and industrial loads - Locating harmonic sources – Power system response characteristics - Harmonics Vs transients. Effect of harmonics – Harmonic distortion - Voltage and current distortions - Harmonic indices - Inter harmonics – Resonance Harmonic distortion evaluation, IEEE and IEC standards.

UNIT IV PASSIVE POWER COMPENSATORS 9

Principle of Operation of Passive Shunt and Series Compensators, Analysis and Design of Passive Shunt Compensators Simulation and Performance of Passive Power Filters- Limitations of Passive Filters Parallel Resonance of Passive Filters with the Supply System

and Its Mitigation. Fundamentals of load compensation – voltage regulation & power factor correction.

UNIT V POWER QUALITY MONITORING & CUSTOM POWER DEVICES 9

Monitoring considerations - Monitoring and diagnostic techniques for various power quality problems - Quality measurement equipment - Harmonic / spectrum analyzer - Flicker meters Disturbance analyzer - Applications of expert systems for power quality monitoring. Principle& Working of DSTATCOM – DSTATCOM in Voltage control mode, current control mode, DVR Structure – Rectifier supported DVR – DC Capacitor supported DVR -Unified power quality conditioner.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand various sources, causes and effects of power quality issues, electrical systems and their measures and mitigation.
Ability to analyze the causes & Mitigation techniques of various PQ events. Ability to study about the various Active & Passive power filters.
Ability to understand the concepts about Voltage and current distortions, harmonics. Ability to analyze and design the passive filters.
Ability to acquire knowledge on compensation techniques. Ability to acquire knowledge on DVR.

TEXT BOOKS:

Roger. C. Dugan, Mark. F. Mc Granagham, Surya Santoso, H.WayneBeaty, "Electrical Power Systems Quality", McGraw Hill,2003
J. Arrillaga, N.R. Watson, S. Chen, "Power System Quality Assessment", (New York : Wiley),2000.
Bhim Singh, Ambrish Chandra, Kamal Al-Haddad," Power Quality Problems & Mitigation Techniques" Wiley, 2015.

REFERENCES

G.T. Heydt, "Electric Power Quality", 2nd Edition. (West Lafayette, IN, Stars in a Circle Publications, 1994.
M.H.J Bollen, "Understanding Power Quality Problems: Voltage Sags and Interruptions", (New York: IEEE Press), 2000.

EE8007 EHVAC TRANSMISSION L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

EHVAC Transmission lines

Electrostatic field of AC lines Corona in E.H.V. lines

UNIT I INTRODUCTION 9

EHVAC Transmission line trends and preliminary aspect - standard transmission voltages – Estimation at line and ground parameters-Bundle conductors: Properties -Inductance and Capacitance of EHV lines – Positive, negative and zero sequence impedance – Line Parameters for Modes of Propagation.

UNIT II ELECTROSTATIC FIELDS 9

Electrostatic field and voltage gradients – Calculations of electrostatic field of AC lines – Effect of high electrostatic field on biological organisms and human beings - Surface voltage gradients and Maximum gradients of actual transmission lines – Voltage gradients on sub conductor.

UNIT III POWER CONTROL 9

Electrostatic induction in un energized lines – Measurement of field and voltage gradients for three phase single and double circuit lines – Un energized lines. Power Frequency Voltage control and overvoltage in EHV lines: No load voltage – Charging currents at power frequency-Voltage control – Shunt and Series compensation – Static VAR compensation.

UNIT IV CORONA EFFECTS AND RADIO INTERFERENCE 9

Corona in EHV lines – Corona loss formulae-Charge voltage diagram- Attenuation of traveling waves due to Corona – Audio noise due to Corona, its generation, characteristic and limits. Measurements of audio noise radio interference due to Corona - properties of radio noise – Frequency spectrum of RI fields – Measurements of RI and RIV.

UNIT V STEADY STATE AND TRANSIENT LIMITS 9

Design of EHV lines based on steady state and transient limits - EHV cables and their characteristics-Introduction six phase transmission – UHV.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand the principles and types of EHVAC system. Ability to analyze the electrostatic field of AC lines

Ability to study about the compensation.

Ability to study about the corona in E.H.V. lines Ability to understand the EHV cables.

Ability to analyze the steady state and transient limits.

TEXT BOOKS:

Rokosh Das Begamudre, ”Extra High Voltage AC Transmission Engineering”– Wiley Eastern LTD., NEW DELHI 1990.

S. Rao, “HVAC and HVDC Transmission, Engineering and Practice” Khanna

Subir Ray, “An Introduction to High Voltage Engineering”, Prentice Hall of India Private Limited, 2013.

RD Begamudre, “Extra High Voltage AC Transmission Engineering”– New Academic Science Ltd; 4 edition 2011.

Edison,” EHV Transmission line”- Electric Institution, GEC, 1968.

EC8395 COMMUNICATION ENGINEERING LTPC

300 3

OBJECTIVES:

To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues

To study the various analog and digital modulation techniques

To study the principles behind information theory and coding

To study the various digital communication techniques

UNIT I ANALOG MODULATION 9

Amplitude Modulation – AM, DSBSC, SSBSC, VSB – PSD, modulators and demodulators – Angle modulation – PM and FM – PSD, modulators and demodulators – Superheterodyne receivers

UNITII PULSE MODULATION 9

Low pass sampling theorem – Quantization – PAM – Line coding – PCM, DPCM, DM, and ADPCM And ADM, Channel Vocoder - Time Division Multiplexing, Frequency Division Multiplexing

UNIT III DIGITAL MODULATION AND TRANSMISSION 9

Phase shift keying – BPSK, DPSK, QPSK – Principles of M-ary signaling M-ary PSK & QAM – Comparison, ISI – Pulse shaping – Duo binary encoding – Cosine filters – Eye pattern, equalizers

UNIT IV INFORMATION THEORY AND CODING 9

Measure of information – Entropy – Source coding theorem – Shannon–Fano coding, Huffman Coding, LZ Coding – Channel capacity – Shannon-Hartley law – Shannon's limit – Error control codes – Cyclic codes, Syndrome calculation – Convolution Coding, Sequential and Viterbi decoding

UNIT V SPREAD SPECTRUM AND MULTIPLE ACCESS 9

PN sequences – properties – m-sequence – DSSS – Processing gain, Jamming – FHSS – Synchronisation and tracking – Multiple Access – FDMA, TDMA, CDMA,

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Ability to comprehend and appreciate the significance and role of this course in the present contemporary world

Apply analog and digital communication techniques.

Use data and pulse communication techniques.

Analyze Source and Error control coding.

TEXT BOOKS:

H Taub, D L Schilling, G Saha, "Principles of Communication Systems" 3/e, TMH 2007

S. Haykin "Digital Communications" John Wiley 2005

REFERENCES:

B.P.Lathi, "Modern Digital and Analog Communication Systems", 3rd edition, Oxford University Press, 2007

H P Hsu, Schaum Outline Series – "Analog and Digital Communications" TMH 2006

B.Sklar, Digital Communications Fundamentals and Applications" 2/e Pearson Education 2007.

GE8071 DISASTER MANAGEMENT LTPC
3003

OBJECTIVES:

To provide students an exposure to disasters, their significance and types.
To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR) To enhance awareness of institutional processes in the country and
To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9 Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be ability to
Differentiate the types of disasters, causes and their impact on environment and society
Assess vulnerability and various methods of risk reduction measures as well as mitigation.

Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

TEXTBOOKS:

Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423

Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]

Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011

Kapur Anu Vulnerability India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES

Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005

Government of India, National Disaster Management Policy,2009.

GE8074 HUMAN RIGHTS LTPC

3003

OBJECTIVES :

To sensitize the Engineering students to various aspects of Human Rights.

UNIT I 9

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II 9

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III 9

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV 9

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V 9

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabilityd persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

OUTCOME :

Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.

Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.

Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

MG8491	OPERATIONS RESEARCH	L	T	P	C
		3	0	0	3

OBJECTIVES:

To provide knowledge and training in using optimization techniques under limited resources for the engineering and business problems.

UNIT I LINEAR MODELS **15**

The phase of an operation research study – Linear programming – Graphical method– Simplex algorithm – Duality formulation – Sensitivity analysis.

UNIT II TRANSPORTATION MODELS AND NETWORK MODELS **8**

Transportation Assignment Models –Traveling Salesman problem- Networks models – Shortest route – Minimal spanning tree – Maximum flow models –Project network – CPM and PERT networks – Critical path scheduling – Sequencing models.

UNIT III INVENTORY MODELS **6**

Inventory models – Economic order quantity models – Quantity discount models – Stochastic inventory models – Multi product models – Inventory control models in practice.

UNIT IV QUEUEING MODELS **6**

Queueing models - Queueing systems and structures – Notation parameter – Single server and multi server models – Poisson input – Exponential service – Constant rate service – Infinite population – Simulation.

UNIT V DECISION MODELS **10**

Decision models – Game theory – Two person zero sum games – Graphical solution- Algebraic solution– Linear Programming solution – Replacement models – Models based on service life – Economic life– Single / Multi variability search technique – Dynamic Programming – Simple Problem.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the students can ability to use the optimization techniques for use engineering and Business problems

TEXT BOOK:

Hillier and Libeberman, "Operations Research", Holden Day, 2005

Taha H.A., "Operations Research", Sixth Edition, Prentice Hall of India, 2003.

REFERENCES:

Bazara M.J., Jarvis and Sherali H., "Linear Programming and Network Flows", John Wiley, 2009.

Budnick F.S., "Principles of Operations Research for Management", Richard D Irwin, 1990.
Philip D.T. and Ravindran A., "Operations Research", John Wiley, 1992.
Shennoy G.V. and Srivastava U.K., "Operation Research for Management", Wiley Eastern, 1994.
Tulsian and Pasdey V., "Quantitative Techniques", Pearson Asia, 2002.

MA8391 PROBABILITY AND STATISTICS L T P C
4 0 0 4

OBJECTIVES :

This course aims at providing the required skill to apply the statistical tools in engineering problems.
To introduce the basic concepts of probability and random variables.
To introduce the basic concepts of two dimensional random variables.
To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

UNIT I PROBABILITY AND RANDOM VARIABLES 12
Probability – The axioms of probability – Conditional probability – Baye's theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

UNIT II TWO - DIMENSIONAL RANDOM VARIABLES 12
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III TESTING OF HYPOTHESIS 12
Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) - Goodness of fit.

UNIT IV DESIGN OF EXPERIMENTS 12
One way and Two way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.

UNIT V STATISTICAL QUALITY CONTROL `12
Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

TOTAL : 60 PERIODS

OUTCOMES :
Upon successful completion of the course, students will be able to:

Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
Apply the concept of testing of hypothesis for small and large samples in real life problems.
Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
Have the notion of sampling distributions and statistical techniques used in engineering and management problems.

TEXT BOOKS :

Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th

Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.

Papoulis, A. and Unnikrishnapillai, S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, 4th Edition, New Delhi, 2010.

Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 3rd Edition, Elsevier, 2004.

Spiegel. M.R., Schiller. J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.

Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 8th Edition, 2007.

EI8075 FIBRE OPTICS AND LASER INSTRUMENTS LTPC 3003

AIM:

To contribute to the knowledge of Fibre optics and Laser Instrumentation and its Industrial andMedical Application.

COURSE OBJECTIVES

To expose the students to the basic concepts of optical fibres and their properties. To provide adequate knowledge about the Industrial applications of optical fibres. To expose the students to the Laser fundamentals.
To provide adequate knowledge about Industrial application of lasers.
To provide adequate knowledge about holography and Medical applications of Lasers.

UNIT I OPTICAL FIBRES AND THEIR PROPERTIES 9

Construction of optical fiber cable: Guiding mechanism in optical fiber and Basic component of optical fiber communication, –Principles of light propagation through a fibre: Total internal reflection, Acceptance angle (θa), Numerical aperture and Skew mode, –Different types of fibres and their properties: Single and multimode fibers and Step index and graded index fibers,– fibrecharacteristics: Mechanical characteristics and Transmission characteristics, – Absorption losses – Scattering losses – Dispersion – Connectors and splicers –Fibre termination – Optical sources: Light Emitting Diode (LED), – Optical detectors: PIN Diode.

UNIT II INDUSTRIAL APPLICATION OF OPTICAL FIBRES 9

Fibre optic sensors: Types of fiber optics sensor, Intrinsic sensor- Temperature/ Pressure sensor, Extrinsic sensors, Phase Modulated Fibre Optic Sensor and Displacementsensor (Extrinsic Sensor) – Fibre optic instrumentation system: Measurement of attenuation (by cut back method), Optical domain reflectometers, Fiber Scattering loss Measurement, Fiber Absorption Measurement, Fiber dispersion measurements, End reflection method and Near field scanning techniques – Different types of modulators: Electro-optic modulator (EOM) –Interferometric method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain.

UNIT III LASER FUNDAMENTALS 9

Fundamental characteristics of lasers – Level Lasers: Two-Level Laser, Three Level Laser, Quasi Three and four level lasers – Properties of laser: Monochromaticity, Coherence, Divergence and Directionality and Brightness –Laser modes – Resonator configuration – Q-switching and mode locking – Cavity damping – Types of lasers; – Gas lasers, solid lasers, liquid lasers and semiconductor lasers.

UNIT IV INDUSTRIAL APPLICATION OF LASERS 9

Laser for measurement of distance, Laser for measurement of length, Laser for measurement of velocity, Laser for measurement of acceleration, Laser for measurement of current, voltage and Laser for measurement of Atmospheric Effect: Types of LIDAR, Construction And Working, and LIDAR Applications – Material processing: Laser instrumentation for material processing, Powder Feeder, Laser Heating, Laser Welding, Laser Melting, Conduction Limited Melting and Key Hole Melting – Laser trimming of material: Process Of Laser Trimming, Types Of Trim, Construction And Working Advantages – Material Removal and vaporization: Process Of Material Removal.

UNIT V HOLOGRAM AND MEDICAL APPLICATIONS 9

Holography: Basic Principle, Holography vs. photography, Principle Of Hologram Recording, Condition For Recording A Hologram, Reconstructing and viewing the holographic image– Holography for non-destructive testing – Holographic components – Medical applications of lasers, laser-Tissue Interactions Photochemical reactions, Thermalisation, collisional relaxation, Types of Interactions and Selecting an Interaction Mechanism – Laser instruments for surgery, removal of tumors of vocal cards, brain surgery, plastic surgery, gynaecology and oncology.

TOTAL : 45 PERIODS

COURSE OUTCOMES (COs):

Understand the principle, transmission, dispersion and attenuation characteristics of opticalfibers

Apply the gained knowledge on optical fibers for its use as communication medium and as sensor as well which have important applications in production, manufacturing industrial and biomedical applications.

Understand laser theory and laser generation system.

Students will gain ability to apply laser theory for the selection of lasers for a specific Industrial and medical application.

TEXT BOOKS:

J.M. Senior, 'Optical Fibre Communication – Principles and Practice', Prentice Hall of India,1985.

J. Wilson and J.F.B. Hawkes, 'Introduction to Opto Electronics', Prentice Hall of India, 2001.

Eric Udd, William B., and Spillman, Jr., "Fiber Optic Sensors: An Introduction for Engineers and Scientists ", John Wiley & Sons, 2011.

REFERENCES:

G. Keiser, 'Optical Fibre Communication', McGraw Hill, 1995.

M. Arumugam, 'Optical Fibre Communication and Sensors', Anuradha Agencies, 2002.

John F. Ready, "Industrial Applications of Lasers", Academic Press, Digitized in 2008.

Monte Ross, 'Laser Applications', McGraw Hill, 1968.
John and Harry, "Industrial lasers and their application", McGraw-Hill, 2002.
Keiser, G., "Optical Fiber Communication", McGraw-Hill, 3rd Edition, 2000. http://nptel.ac.in/courses/117101002/

GE8072	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- **To understand the global trends and development methodologies of various types of products and services**
- **To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems**
- **To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification**
- **To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics**
- **To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer**

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision - Social Trends - Technical Trends-Economical Trends - Environmental Trends - Political/Policy Trends - Introduction to Product Development Methodologies and Management - Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies

Product Life Cycle – Product Development Planning and Management.

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9 Requirement Engineering - Types of Requirements - Requirement Engineering -
traceability Matrix and Analysis - Requirement Management - System Design & Modeling - Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design.

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – Challenges in Integration of Engineering Disciplines - Concept Screening & Evaluation - Detailed Design - Component Design and Verification – Mechanical, Electronics and Software Subsystems - High Level Design/Low Level Design of S/W Program - Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – Prototyping - Introduction to Rapid Prototyping and Rapid Manufacturing - System Integration, Testing, Certification and Documentation

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product Validation processes and stages - Product Testing Standards and Certification - Product Documentation Sustenance -Maintenance and Repair – Enhancements - Product EoL - Obsolescence Management – Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product Development in Industry versus Academia –The IPD Essentials - Introduction to Vertical Specific Product Development processes -Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and Software Systems – Product Development Trade-offs - Intellectual Property Rights and Confidentiality – Security and Configuration Management.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- **Define, formulate and analyze a problem**
- **Solve specific problems independently or as part of a team**
- **Gain knowledge of the Innovation & Product Development process in the Business Context**
- **Work independently as well as in teams**
- **Manage a project from start to finish**

TEXTBOOKS:

- **Book specially prepared by NASSCOM as per the MoU.**
- **Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, Fifth Edition, 2011.**
- **John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill, Eleventh Edition, 2005.**

REFERENCES:

- **Hiriyappa B, "Corporate Strategy – Managing the Business", Author House, 2013.**
- **Peter F Drucker, "People and Performance", Butterworth – Heinemann [Elsevier], Oxford, 2004.**
- **Vinod Kumar Garg and Venkita Krishnan N K, "Enterprise Resource Planning – Concepts", Second Edition, Prentice Hall, 2003.**
- **Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, Seventh Edition, 2013**

EE8008 SYSTEM IDENTIFICATION AND ADAPTIVE CONTROL L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

- **The concept of system identification and adaptive control**
- **Black-box approach based system identification**
- **Batch and recursive identification**
- **Computer Controlled Systems**

Design concept for adaptive control schemes

UNIT I NON-PARAMETRIC METHODS 9

Non-parametric methods - Transient analysis - frequency analysis - Correlation analysis - Spectral analysis - Input signal design for identification

UNIT II PARAMETRIC METHODS 9

Least squares estimation – Analysis of the least squares estimate - Best linear unbiased estimate – Model parameterizations - Prediction error methods.

UNIT III RECURSIVE IDENTIFICATION METHODS 9

The recursive least square method - Model validation –Model structure determination - Introduction to closed loop system identification.

UNIT IVADAPTIVE CONTROL SCHEMES 9

Introduction – Auto-tuning of PID controller using relay feedback approach – Types of adaptive control, Gain scheduling, Model reference adaptive control, Self–tuning controller – Design of gain scheduled adaptive controller – Applications of gain scheduling.

UNIT V MODEL-REFERENCE ADAPTIVE SYSTEM (MRAS) and SELF-TUNING REGULATOR (STR) 9

STR – Pole placement design – Indirect STR and direct STR – MRAC - MIT rule – Lyapunov theory – Relationship between MRAC and STR.

TOTAL : 45 PERIODS

OUTCOMES:

- **Ability to understand various system identification techniques and features of adaptive control like STR and MRAC.**
- **Ability to understand the concept of system identification and adaptive control**
- **Ability to understand about Black-box approach based system identification**
- **Ability to get knowledge about batch and recursive identification**

Ability to study about computer controlled systems

Ability to design concept for adaptive control schemes

TEXT BOOKS:

- **T. Soderstrom and PetreStoica, System Identification, Prentice Hall International (UK) Ltd. 1989**
- **Karl J. Astrom and Bjorn Witten mark, Adaptive Control, Pearson Education, Second edition, Fifth impression, 2009.**

REFERENCES

- **L. Ljung, System Identification - Theory for the User, 2nd edition, PTR Prentice Hall,**

Upper Saddle River, N.J., 1999.
K. S. Narendra and A. M. Annaswamy, Stability Adaptive Systems, Prentice-Hall, 1989.
H. K. Khalil, Nonlinear Systems, Prentice Hall, 3rd edition, 2002.
William S.Levine, "Control Systems Advanced Methods, the Control Handbook, CRC Press 2011.
S. Sastry and M. Bodson, Adaptive Control, Prentice-Hall, 1989

CS8491 COMPUTER ARCHITECTURE L T P C 3003

OBJECTIVES:

- To learn the basic structure and operations of a computer.
- To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
- To learn the basics of pipelined execution.
- To understand parallelism and multi-core processors.
- To understand the memory hierarchies, cache memories and virtual memories.
- To learn the different ways of communication with I/O devices.

UNIT I BASIC STRUCTURE OF A COMPUTER SYSTEM 9

Functional Units – Basic Operational Concepts – Performance – Instructions: Language of the Computer – Operations, Operands – Instruction representation – Logical operations – decision making – MIPS Addressing.

UNIT IIARITHMETIC FOR COMPUTERS 9

Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism

UNIT III PROCESSOR AND CONTROL UNIT 9

A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions.

UNIT IV PARALLELISIM 9

Parallel processing challenges – Flynn's classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

UNIT VMEMORY & I/O SYSTEMS 9

Memory Hierarchy - memory technologies – cache memory – measuring and improving cache performance – virtual memory, TLB's – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits - USB.

TOTAL : 45 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

Understand the basics structure of computers, operations and instructions. Design arithmetic and logic unit.

Understand pipelined execution and design control unit. Understand parallel processing architectures.

Understand the various memory systems and I/O communication.

TEXT BOOKS:

David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.

Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

REFERENCES

William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.

John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012.

John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approachll, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

EE8009 CONTROL OF ELECTRICAL DRIVES L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

To understand the DC drive control.

To study and analyze the Induction motor drive control.

To study and understand the Synchronous motor drive control.

To study and analyze the SRM and BLDC motor drive control.

To analyze and design the Digital control for drives.

UNIT I CONTROL OF DC DRIVES 9

Losses in electrical drive system, Energy efficient operation of drives, block diagram/ transfer function of self, separately excited DC motors -- closed loop control-speed control-current control - constant torque/power operation - P, PI and PID controllers–response comparison.

UNIT II CONTROL OF INDUCTION MOTORDRIVE 9

VSI and CSI fed induction motor drives-principles of V/f control-closed loop variable frequency PWM inverter with dynamic braking- static Scherbius drives- power factor considerations– modified Kramer drives-principle of vector control- implementation-block diagram, Design of closed loop operation of V/f control of Induction motor drive systems.

UNIT III CONTROL OF SYNCHRONOUS MOTOR DRIVES 9

Open loop VSI fed drive and its characteristics–Self control–Torque control –Torque angle 113

control –Power factor control–Brushless excitation systems—Field oriented control – Design of closed loop operation of Self control of Synchronous motor drive systems.

UNIT IV CONTROL OF SRM AND BLDC MOTOR DRIVES 9

SRM construction - Principle of operation - SRM drive design factors-Torque controlled SRM- Block diagram of Instantaneous Torque control using current controllers and flux controllers. Construction and Principle of operation of BLDC Machine -Sensing and logic switching scheme,-Sinusoidal and trapezoidal type of Brushless dc motors – Block diagram of current controlled Brushless dc motor drive.

UNIT V DIGITAL CONTROL OF DC DRIVE 9

Phase Locked Loop and micro-computer control of DC drives–Program flow chart for constant constant torque and constant horse power operations Speed detection and current sensing circuits and feedback elements.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand various control strategies and controllers for AC and DC Motor Drive systems.

TEXT BOOKS:

Dubey, G.K, Power semiconductor controlled devices, Prentice Hall International New jersey, 1989.

R.Krishnan,, Electric Motor Drives - Modeling, Analysis and ControlPrentice-Hall of India Pvt. Ltd., New Delhi, 2003.

Murphy, J.M.D, Turnbull F.G, Thyristor control of AC motors,., Pergamon press, Oxford, 1988.

REFERENCES

Bin Wu, High-Power Converters and AC Drives, Wiley-IEEE Press

Buxbaum, A.Schierau, and K.Staughen, A design of control systems for DC drives, Springer-Verlag, Berlin, 1990.

Bimal K. Bose, Modern Power Electronics and AC Drives, Pearson Education (Singapore) Pte. Ltd., New Delhi, 2003.

R. Krishnan, Switched Reluctance Motor Drives: Modeling, Simulation, Analysis, Design, and Applications, CRC press, 2001.

Werner Leonhard, Control of Electrical Drives, 3rd Edition, Springer, Sept., 2001.

R. Krishnan, Permanent Magnet Synchronous and Brushless DC Motor Drives, CRC press, 2001.

EC8095 VLSI DESIGN L T P C 3003

OBJECTIVES:

Study the fundamentals of CMOS circuits and its characteristics.

Learn the design and realization of combinational & sequential digital circuits.

Architectural choices and performance tradeoffs involved in designing and realizing the circuits in CMOS technology are discussed

Learn the different FPGA architectures and testability of VLSI circuits.

UNIT I INTRODUCTION TO MOS TRANSISTOR 9

MOS Transistor, CMOS logic, Inverter, Pass Transistor, Transmission gate, Layout Design Rules, Gate Layouts, Stick Diagrams, Long-Channel I-V Charters tics, C-V Charters tics, Nonideal I-V Effects, DC Transfer characteristics, RC Delay Model, Elmore Delay, Linear Delay Model, Logical effort, Parasitic Delay, Delay in Logic Gate, Scaling.

UNIT II COMBINATIONAL MOS LOGIC CIRCUITS 9

Circuit Families: Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass Transistor Logic, Transmission Gates, Domino, Dual Rail Domino, CPL, DCVSPG, DPL, Circuit Pitfalls.

Power: Dynamic Power, Static Power, Low Power Architecture.

UNIT III SEQUENTIAL CIRCUIT DESIGN 9

Static latches and Registers, Dynamic latches and Registers, Pulse Registers, Sense Amplifier Based Register, Pipelining, Schmmit Trigger, Monostability Sequential Circuits, Astability Sequential Circuits.

Timing Issues : Timing Classification Of Digital System, Synchronous Design.

UNIT IV DESIGN OF ARITHMETIC BUILDING BLOCKS AND SUBSYSTEM 9

Arithmetic Building Blocks: Data Paths, Adders, Multipliers, Shifters, ALUs, power and speed tradeoffs, Case Study: Design as a tradeoff.

Designing Memory and Array structures: Memory Architectures and Building Blocks, Memory Core, Memory Peripheral Circuitry.

UNIT V IMPLEMENTATION STRATEGIES AND TESTING 9

FPGA Building Block Architectures, FPGA Interconnect Routing Procedures.

Design for Testability: Ad Hoc Testing, Scan Design, BIST, IDDQ Testing, Design for Manufacturability, Boundary Scan.

TOTAL : 45 PERIODS

OUTCOMES:

UPON COMPLETION OF THE COURSE, STUDENTS SHOULD ABILITY TO

- **Realize the concepts of digital building blocks using MOS transistor.**
- **Design combinational MOS circuits and power strategies.**
- **Design and construct Sequential Circuits and Timing systems.**
- **Design arithmetic building blocks and memory subsystems.**
- **Apply and implement FPGA design flow and testing.**

TEXT BOOKS:

1. **Neil H.E. Weste, David Money Harris "CMOS VLSI Design: A Circuits and Systems Perspective", 4th Edition, Pearson , 2017.(UNIT I,II,V)**
2. **Jan M. Rabaey ,Anantha Chandrakasan, Borivoje. Nikolic, "Digital Integrated Circuits:A Design perspective", Second Edition , Pearson , 2016.(UNIT III,IV)**

REFERENCES

1. **M.J. Smith, "Application Specific Integrated Circuits", Addisson Wesley,**

Sung-Mo kang, Yusuf leblebici, Chulwoo Kim "CMOS Digital Integrated Circuits:Analysis & Design",4th edition McGraw Hill Education,2013
Wayne Wolf, "Modern VLSI Design: System On Chip", Pearson Education, 2007
R.Jacob Baker, Harry W.Ll., David E.Boyee, "CMOS Circuit Design, Layout and Simulation", Prentice Hall of India 2005.

EE8010 POWER SYSTEMS TRANSIENTS L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

Generation of switching transients and their control using circuit – theoretical concept. Mechanism of lighting strokes and the production of lighting surges.

Propagation, reflection and refraction of travelling waves.

Voltage transients caused by faults, circuit breaker action, load rejection on integrated power system.

UNIT I INTRODUCTION AND SURVEY 9

Review and importance of the study of transients - causes for transients. RL circuit transient with sine wave excitation - double frequency transients - basic transforms of the RLC circuit transients. Different types of power system transients - effect of transients on power systems – role of the study of transients in system planning.

UNIT II SWITCHING TRANSIENTS 9

Over voltages due to switching transients - resistance switching and the equivalent circuit for interrupting the resistor current - load switching and equivalent circuit - waveforms for transient voltage across the load and the switch - normal and abnormal switching transients. Current suppression - current chopping - effective equivalent circuit. Capacitance switching - effect of source regulation - capacitance switching with a restrike, with multiple restrikes. Illustration for multiple restriking transients - ferro resonance.

UNIT III LIGHTNING TRANSIENTS 9

Review of the theories in the formation of clouds and charge formation - rate of charging of thunder clouds – mechanism of lightning discharges and characteristics of lightning strokes – model for lightning stroke - factors contributing to good line design - protection using ground wires - tower footing resistance - Interaction between lightning and power system.

UNIT IV TRAVELING WAVES ON TRANSMISSION LINE COMPUTATION OF TRANSIENTS 9

Computation of transients - transient response of systems with series and shunt lumped parameters and distributed lines. Traveling wave concept - step response - Bewely's lattice diagram - standing waves and natural frequencies - reflection and refraction of travelling waves.

UNIT V TRANSIENTS IN INTEGRATED POWER SYSTEM 9

The short line and kilometric fault - distribution of voltages in a power system - Line dropping and load rejection - voltage transients on closing and reclosing lines -

over 116

voltage induced by faults -switching surges on integrated system Qualitative application of EMTP for transient computation.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand and analyze switching and lightning transients.

Ability to acquire knowledge on generation of switching transients and their control. Ability to analyze the mechanism of lighting strokes.

Ability to understand the importance of propagation, reflection and refraction of travelling waves.

Ability to find the voltage transients caused by faults.

Ability to understand the concept of circuit breaker action, load rejection on integrated power system.

TEXT BOOKS:

Allan Greenwood, 'Electrical Transients in Power Systems', Wiley Inter Science, New York, 2nd Edition, 1991.

Pritindra Chowdhari, "Electromagnetic transients in Power System", John Wiley and Sons Inc., Second Edition, 2009.

C.S. Indulkar, D.P.Kothari, K. Ramalingam, 'Power System Transients – A statistical approach', PHI Learning Private Limited, Second Edition, 2010.

REFERENCES

M.S.Naidu and V.Kamaraju, 'High Voltage Engineering', McGraw Hill, Fifth Edition, 2013.

R.D. Begamudre, 'Extra High Voltage AC Transmission Engineering', Wiley Eastern Limited, 1986.

Y.Hase, Handbook of Power System Engineering," Wiley India, 2012.

J.L.Kirtley, "Electric Power Principles, Sources, Conversion, Distribution and use," Wiley, 2012.

Akihiro ametani," Power System Transient theory and applications", CRC press, 2013.

GE8077 TOTAL QUALITY MANAGEMENT L T P C

3 0 0 3

OBJECTIVE:

To facilitate the understanding of Quality Management principles and process.

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.

UNIT II TQM PRINCIPLES 9

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I 9

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II 9

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM 9

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation—Documentation—Internal Audits—Registration--ENVIRONMENTAL MANAGEMENT SYSTEM: Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001— Benefits of EMS.

TOTAL: 45 PERIODS

OUTCOME:

The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXT BOOK:

Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, "Total Quality Management", Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

REFERENCES:

1. **James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.**
   Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
   Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
   ISO9001-2015 standards

EE8011	FLEXIBLE AC TRANSMISSION SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES: To impart knowledge about the following topics:

The start-of-art of the power system

Performance of power systems with FACTS controllers.

FACTS controllers for load flow and dynamic analysis

UNIT I INTRODUCTION 9

Real and reactive power control in electrical power transmission lines–loads & system compensation-Uncompensated transmission line–shunt and series compensation.

UNIT II STATIC VAR COMPENSATOR (SVC) AND APPLICATIONS 9

Voltage control by SVC–Advantages of slope in dynamic characteristics–Influence of SVC on system voltage–Design of SVC voltage regulator–TCR-FC-TCR-Modeling of SVC for power flow and fast transient stability– Applications: Enhancement of transient stability –

Steady state power transfer –Enhancement of power system damping.

UNIT III THYRISTOR CONTROLLED SERIES CAPACITOR (TCSC) AND APPLICATIONS 9

Operation of the TCSC–Different modes of operation–Modelling of TCSC, Variability reactance model– Modelling for Power Flow and stability studies. Applications: Improvement of the system stability limit–Enhancement of system damping.

UNIT IV VOLTAGE SOURCE CONVERTER BASED FACTS CONTROLLERS 9

Static Synchronous Compensator (STATCOM)–Principle of operation–V-I Characteristics. Applications: Steady state power transfer-enhancement of transient stability-prevention of voltage instability. SSSC-operation of SSSC and the control of power flow–modelling of SSSC in load flow and transient stability studies- Dynamic voltage restorer(DVR).

UNIT V ADVANCED FACTS CONTROLLERS 9

Interline DVR(IDVR) - Unified Power flow controller (UPFC) - Interline power flow controller (IPFC) - Unified Power quality conditioner (UPQC).

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand, analyze and develop analytical model of FACTS controller for power system application.

Ability to understand the concepts about load compensation techniques. Ability to acquire knowledge on facts devices.

Ability to understand the start-of-art of the power system

Ability to analyze the performance of steady state and transients of facts controllers. Ability to study about advanced FACTS controllers.

TEXT BOOKS:

R.Mohan Mathur, Rajiv K.Varma,"Thyristor–Based Facts Controllers for Electrical Transmission Systems", IEEE press andJohnWiley&Sons,Inc,2002.

NarainG. Hingorani, "Understanding FACTS-Concepts and Technology of Flexible AC Transmission Systems", Standard Publishers Distributors,Delhi-110006,2011.

T.J.E Miller, Power Electronics in power systems, John Wiley and sons.

REFERENCES

K.R. Padiyar, "FACTS Controllers in Power Transmission and Distribution", New Age International (P) Limited, Publishers, New Delhi, 2008

A.T.John,"FlexibleA.C.TransmissionSystems",InstitutionofElectricalandElectronic Engineers(IEEE), 1999.

V.K.Sood, HVDC and FACTS controllers–Applications of Static Converters in Power System, APRIL2004,KluwerAcademic Publishers,2004.

EE8012 SOFT COMPUTING TECHNIQUES L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:
Basics of artificial neural network.
Concepts of modelling and control of neural and fuzzy control schemes. Features of hybrid control schemes.

UNIT I ARTIFICIAL NEURAL NETWORK 9
Review of fundamentals – Biological neuron, artificial neuron, activation function, single layer perceptron – Limitation – Multi layer perceptron – Back Propagation Algorithm (BPA) – Recurrent Neural Network (RNN) – Adaptive Resonance Theory (ART) based network – Radial basis function network – online learning algorithms, BP through time – RTRL algorithms – Reinforcement learning.

UNIT II NEURAL NETWORKS FOR MODELING AND CONTROL 9
Modelling of non-linear systems using ANN – Generation of training data – Optimal architecture– Model validation – Control of non-linear systems using ANN – Direct and indirect neuro control schemes – Adaptive neuro controller – Familiarization with neural network toolbox.

UNIT III FUZZY SET THEORY 9
Fuzzy set theory – Fuzzy sets – Operation on fuzzy sets – Scalar cardinality, fuzzy cardinality, union and intersection, complement (Yager and Sugeno), equilibrium points, aggregation, projection, composition, cylindrical extension, fuzzy relation – Fuzzy membership functions.

UNIT IV FUZZY LOGIC FOR MODELING AND CONTROL 9
Modelling of non-linear systems using fuzzy models – TSK model – Fuzzy logic controller – Fuzzification – Knowledge base – Decision making logic – Defuzzification – Adaptive fuzzy systems – Familiarization with fuzzy logic toolbox.

UNIT V HYBRID CONTROL SCHEMES 9
Fuzzification and rule base using ANN – Neuro fuzzy systems – ANFIS – Fuzzy neuron– GA – Optimization of membership function and rule base using Genetic Algorithm – Introduction to other evolutionary optimization techniques, support vector machine– Case study – Familiarization with ANFIS toolbox.

TOTAL : 45 PERIODS

OUTCOMES:
Ability to understand the concepts of ANN, different features of fuzzy logic and their modelling, control aspects and different hybrid control schemes.
Ability to understand the basics of artificial neural network.
Ability to get knowledge on modelling and control of neural.
Ability to get knowledge on modelling and control of fuzzy control schemes. Ability to acquire knowledge on hybrid control schemes.
Ability to understand the concepts of Adaptive Resonance Theory

TEXT BOOKS:
Laurence Fausett, "Fundamentals of Neural Networks", Prentice Hall,

Englewood 120

Cliffs, N.J., 1992
Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill Inc., 2000.

REFERENCES

Goldberg, "Genetic Algorithm in Search, Optimization and Machine learning", Addison Wesley Publishing Company Inc. 1989
Millon W.T., Sutton R.S. and Webrose P.J., "Neural Networks for Control", MIT press, 1992
Ethem Alpaydin, "Introduction to Machine learning (Adaptive Computation and Machine Learning series)', MIT Press, Second Edition, 2010.
Zhang Huaguang and Liu Derong, "Fuzzy Modeling and Fuzzy Control Series: Control Engineering", 2006

EE8013 POWER SYSTEMS DYNAMICS L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

- Basics of dynamics and stability problems
- Modeling of synchronous machines
- Excitation system and speed-governing controllers.
- Small signal stability of a single-machine infinite bus system with excitation system and power system stabilizer.
- Transient stability simulation of multi machine power system.

UNIT I INTRODUCTION 9

Basics of system dynamics – numerical techniques – introduction to software packages to study the responses. Concept and importance of power system stability in the operation and design - distinction between transient and dynamic stability - complexity of stability problem in large system – necessity for reduced models - stability of interconnected systems.

UNIT II SYNCHRONOUS MACHINE MODELLING 9

Synchronous machine - flux linkage equations - Park's transformation - per unit conversion normalizing the equations - equivalent circuit - current space model - flux linkage state space model. Sub-transient and transient inductances - time constants. Simplified models (one axis and constant flux linkage) - steady state equations and phasor diagrams.

UNIT III MACHINE CONTROLLERS 9

Exciter and voltage regulators - function and types of excitation systems - typical excitation system configuration - block diagram and state space representation of IEEE type 1 excitation system - saturation function - stabilizing circuit. Function of speed governing systems - block diagram and state space representation of IEEE mechanical hydraulic governor and electrical hydraulic governors for hydro turbines and steam turbines.

UNIT IV TRANSIENT STABILITY 9

State equation for multi machine system with one axis model and simulation – modelling of multi machine power system with one axis machine model including excitation system and speed governing system and simulation using R-K method of fourth order (Gill's technique) for transient stability analysis - power system stabilizer. For all simulations, the algorithm and flow chart have to be discussed.

UNIT V DYNAMIC STABILITY 9

System response to small disturbances - linear model of the unregulated synchronous machine and its modes of oscillation - regulated synchronous machine - distribution of power impact - linearization of the load equation for the one machine problem – simplified linear model - effect of excitation on dynamic stability - approximate system representation supplementary stabilizing signals - dynamic performance measure - small signal performance measures.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand and analyze power system operation, stability, control and protection.

Ability to get knowledge on the basics of dynamics and stability problems Ability to design and modelling of synchronous machines

Ability to study about excitation system and speed-governing controllers.

Ability to understand the concept of small signal stability of a single-machine infinite bus system with excitation system.

Ability to analyze the transient stability simulation.

TEXT BOOKS:

P.M. Anderson and A.A.Fouad, 'Power System Control and Stability', Galgotia Publications, New Delhi, 2003.

P. Kundur, 'Power System Stability and Control', McGraw Hill Inc., USA, 1994.

R.Ramanujam, "Power System Dynamics – Analysis and Simulation", PHI, 2009.

REFERENCES

M.A.Pai and W.Sauer, 'Power System Dynamics and Stability', Pearson Education Asia, India, 2002.

James A.Momoh, Mohamed. E. El-Hawary. " Electric Systems, Dynamics and Stability with Artificial Intelligence applications", Marcel Dekker, USA First Edition, 2000.

C.A.Gross, "Power System Analysis," Wiley India, 2011.

B.M.Weedy, B.J.Lory, N.Jenkins, J.B.Ekanayake and G.Strbac," Electric Power Systems", Wiley India, 2013.

K.Umarao, "Computer Techniques and Models in Power System," I.K. International, 2007.

EE8014 SMPS AND UPS L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

Modern power electronic converters and its applications in electric power utility. Resonant converters and UPS

UNIT I DC-DC CONVERTERS 9

Principles of step down and step up converters – Analysis and state space modeling of Buck, Boost, Buck- Boost and Cuk converters.

UNIT II SWITCHED MODE POWER CONVERTERS 9

Analysis and state space modeling of fly back, Forward, Push pull, Luo, Half bridge and full bridge converters- control circuits and PWM techniques.

UNIT III RESONANT CONVERTERS 9

Introduction- classification- basic concepts- Resonant switch- Load Resonant converters-ZVS , Clamped voltage topologies- DC link inverters with Zero Voltage Switching- Series and parallel Resonant inverters- Voltage control.

UNIT IV DC-AC CONVERTERS 9

Single phase and three phase inverters, control using various (sine PWM, SVPWM and PSPWM) techniques, various harmonic elimination techniques- Multilevel inverters- Concepts - Types: Diode clamped- Flying capacitor- Cascaded types- Applications.

UNIT V POWER CONDITIONERS, UPS & FILTERS 9

Introduction- Power line disturbances- Power conditioners –UPS: offline UPS, Online UPS, Applications – Filters: Voltage filters, Series-parallel resonant filters, filter without series capacitors, filter for PWM VSI, current filter, DC filters – Design of inductor and transformer for PE applications – Selection of capacitors.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to analyze the state space model for DC – DC converters

Ability to acquire knowledge on switched mode power converters.

Ability to understand the importance of Resonant Converters.

Ability to analyze the PWM techniques for DC-AC converters

Ability to acquire knowledge on modern power electronic converters and its applications in electric power utility.

Ability to acquire knowledge on filters and UPS

TEXT BOOKS:

Simon Ang, Alejandro Oliva," Power-Switching Converters", Third Edition, CRC Press, 2010.

KjeldThorborg, "Power Electronics – In theory and Practice", Overseas Press, First Indian Edition 2005.

M.H. Rashid – Power Electronics handbook, Elsevier Publication, 2001.

REFERENCES

Philip T Krein, " Elements of Power Electronics", Oxford University Press

Ned Mohan, Tore.M.Undeland, William.P.Robbins, Power Electronics converters, Applications and design- Third Edition- John Wiley and Sons- 2006

M.H. Rashid – Power Electronics circuits, devices and applications- third edition Prentice Hall of India New Delhi, 2007.
Erickson, Robert W, "Fundamentals of Power Electronics", Springer, second edition, 2010.

EE8015	ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION	L	T	P	C
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OBJECTIVES:

To impart knowledge on the following Topics

To study the generation, conservation of electrical power and energy efficient equipments. To understand the principle, design of illumination systems and energy efficiency lamps. To study the methods of industrial heating and welding.

To understand the electric traction systems and their performance.

UNIT I ILLUMINATION 9

Importance of lighting – properties of good lighting scheme – laws of illumination – photometry - types of lamps – lighting calculations – basic design of illumination schemes for residential, commercial, street lighting, factory lighting and flood lighting – LED lighting and energy efficient lamps.

UNIT II REFRIGERATION AND AIR CONDITIONING Refrigeration-Domestic refrigerator 9 and water coolers - Air-Conditioning-Various types

of air-conditioning system and their applications, smart air conditioning units - Energy Efficient motors: Standard motor efficiency, need for efficient motors, Motor life cycle, Direct Savings and payback analysis, efficiency evaluation factor.

UNIT III HEATING AND WELDING 9

Role of electric heating for industrial applications – resistance heating – induction heating – dielectric heating - electric arc furnaces. Brief introduction to electric welding – welding generator, welding transformer and the characteristics.

UNIT IV TRACTION 9

Merits of electric traction – requirements of electric traction system – supply systems – mechanics of train movement – traction motors and control – braking – recent trends in electric traction.

UNIT V DOMESTIC UTILIZATION OF ELECTRICAL ENERGY 9

Domestic utilization of electrical energy – House wiring. Induction based appliances, Online and OFF line UPS, Batteries - Power quality aspects – nonlinear and domestic loads – Earthing – Domestic, Industrial and Substation.

TOTAL : 45 PERIODS

OUTCOMES:

To understand the main aspects of generation, utilization and conservation.
To identify an appropriate method of heating for any particular industrial application.
To evaluate domestic wiring connection and debug any faults occurred.
To construct an electric connection for any domestic appliance like refrigerator as well as to design a battery charging circuit for a specific household application.
To realize the appropriate type of electric supply system as well as to evaluate the 124

performance of a traction unit.

To understand the main aspects of Traction.

TEXT BOOKS:

Wadhwa, C.L. "Generation, Distribution and Utilization of Electrical Energy", New Age International Pvt. Ltd, 2003.

Dr. Uppal S.L. and Prof. S. Rao, 'Electrical Power Systems', Khanna Publishers, New Delhi, 15th Edition, 2014.

Energy Efficiency in Electric Utilities, BEE Guide Book, 2010

REFERENCES

Partab.H, "Art and Science of Utilisation of Electrical Energy", Dhanpat Rai and Co, New Delhi, 2004.

Openshaw Taylor.E, "Utilization of Electrical Energy in SI Units", Orient Longman Pvt. Ltd, 2003.

Gupta.J.B, "Utilization of Electric Power and Electric Traction", S.K.Kataria and Sons, 2002.

Cleaner Production – Energy Efficiency Manual for GERIAP, UNEP, Bangkok prepared by National Productivity Council.

GE8076 PROFESSIONAL ETHICS IN ENGINEERING LTPC

3003

OBJECTIVES:

To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES 10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES 8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be ability to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXT BOOKS:

Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.

Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.

Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.

John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003

Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.

World Community Service Centre, ' Value Education', Vethathiri publications, Erode, 2011.

Web sources:

www.onlineethics.org
www.nspe.org
www.globalethics.org
www.ethics.org

MG8591 PRINCIPLES OF MANAGEMENT LTPC
3003

OBJECTIVES:

To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization.

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING **9**

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING **9**

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING **9**

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V CONTROLLING **9**

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be ability to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXT BOOKS:

1. **JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004.**
2. **Stephen P. Robbins & Mary Coulter, "Management", Prentice Hall (India)Pvt. Ltd., 10th Edition, 2009.**

REFERENCES:

Harold Koontz & Heinz Weihrich, "Essentials of Management", Tata McGraw Hill, 1998.

Robert Kreitner & Mamata Mohapatra, "Management", Biztantra, 2008.

Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management", 7th Edition, Pearson Education, 2011.

Tripathy PC & Reddy PN, "Principles of Management", Tata Mcgraw Hill, 1999

EE8016 ENERGY MANAGEMENT AND AUDITING L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

To impact concepts behind economic analysis and Load management.

Energy management on various electrical equipments and metering.

Concept of lighting systems and cogeneration.

UNIT I INTRODUCTION 9

Basics of Energy – Need for energy management – Energy accounting - Energy monitoring, targeting and reporting - Energy audit process.

UNIT II ENERGY MANAGEMENT FOR MOTORS AND COGENERATION 9

Energy management for electric motors – Transformer and reactors - Capacitors and synchronous machines, energy management by cogeneration – Forms of cogeneration – Feasibility of cogeneration – Electrical interconnection.

UNIT III LIGHTING SYSTEMS 9

Energy management in lighting systems – Task and the working space - Light sources – Ballasts – Lighting controls – Optimizing lighting energy – Power factor and effect of harmonics, lighting and energy standards.

UNIT IV METERING FOR ENERGY MANAGEMENT 9

Metering for energy management – Units of measure - Utility meters – Demand meters – Paralleling of current transformers – Instrument transformer burdens – Multi tasking solid state meters, metering location vs requirements, metering techniques and practical examples.

UNIT V ECONOMIC ANALYSIS AND MODELS 9

Economic analysis – Economic models - Time value of money - Utility rate structures – Cost of electricity – Loss evaluation, load management – Demand control techniques – Utility monitoring and control system – HVAC and energy management – Economic justification.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand the basics of Energy audit process.

Ability to understand the basics of energy management by cogeneration

Ability to acquire knowledge on Energy management in lighting systems

Ability to impact concepts behind economic analysis and Load management.

Ability to understand the importance of Energy management on various electrical equipment and metering.

Ability to acquire knowledge on HVAC.

TEXT BOOKS:

Barney L. Capehart, Wayne C. Turner, and William J. Kennedy, Guide to Energy Management, Fifth Edition, The Fairmont Press, Inc., 2006

Eastop T.D & Croft D.R, Energy Efficiency for Engineers and Technologists,.Logman Scientific & Technical, ISBN-0-582-03184 , 1990.

REFERENCES

Reay D.A, Industrial Energy Conservation, 1st edition, Pergamon Press, 1977.

IEEE Recommended Practice for Energy Management in Industrial and Commercial Facilities, IEEE, 196.

Amit K. Tyagi, Handbook on Energy Audits and Management, TERI, 2003.

Electricity in buildings good practice guide, McGraw-Hill Education, 2016.

National Productivity Council Guide Books

CS8391 DATA STRUCTURES LTPC

3003

OBJECTIVES:

To understand the concepts of ADTs

To Learn linear data structures – lists, stacks, and queues To understand sorting, searching and hashing algorithms To apply Tree and Graph structures

UNIT I LINEAR DATA STRUCTURES – LIST 9

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation —- singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES 9

Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression - Queue ADT – Operations - Circular Queue – Priority Queue - deQueue – applications of queues.

UNIT III NON LINEAR DATA STRUCTURES – TREES 9

Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree - Heap – Applications of heap.

UNIT IV NON LINEAR DATA STRUCTURES - GRAPHS 9

Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES 9

Searching- Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

Implement abstract data types for linear data structures.

Apply the different linear and non-linear data structures to problem solutions. Critically analyze the various sorting algorithms.

TEXT BOOKS:

Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education,1997.

Reema Thareja, "Data Structures Using C", Second Edition , Oxford University Press, 2011

REFERENCES:

Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.

Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education,1983.

Stephen G. Kochan, "Programming in C", 3rd edition, Pearson Education.

Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, University Press, 2008

EE8017 HIGH VOLTAGE DIRECT CURRENT TRANSMISSION L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

Planning of DC power transmission and comparison with AC power transmission.

HVDC converters.

HVDC system control.

Harmonics and design of filters.

Power flow in HVDC system under steady state.

UNIT I INTRODUCTION 9

DC Power transmission technology–Comparison of AC and DC transmission–Application of DC transmission–Description of DC transmission system–Planning for HVDC transmission– Modern trends in HVDC technology–DC breakers–Operating problems– HVDC transmission based on VSC –Types and applications of MTDC systems.

UNIT II ANALYSIS OF HVDC CONVERTERS 9

Line commutated converter -Analysis of Graetz circuit with and without overlap -Pulse number– Choice of converter configuration – Converter bridge characteristics– Analysis of a 12 pulse converters– Analysis of VSC topologies and firing schemes.

UNIT III CONVERTER AND HVDC SYSTEM CONTROL 9

Principles of DC link control–Converter control characteristics–System control hierarchy– Firing angle control– Current and extinction angle control–Starting and stopping of DC link –Power control –Higher level controllers –Control of VSC based HVDC link.

UNIT IV REACTIVE POWER AND HARMONICS CONTROL 9

Reactive power requirements in steady state–Sources of reactive power–SVC and STATCOM– Generation of harmonics –Design of AC and DC filters– Active filters.

UNIT V POWER FLOW ANALYSIS IN AC/DC SYSTEMS 9

Per unit system for DC quantities–DC system model –Inclusion of constraints – Power flow analysis –case study

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand the principles and types of HVDC system.

Ability to analyze and understand the concepts of HVDC converters. Ability to acquire knowledge on DC link control.

Ability to understand the concepts of reactive power management, harmonics and power flow analysis.

Ability to get knowledge about Planning of DC power transmission and comparison with AC power transmission.

Ability to understand the importance of power flow in HVDC system under steady state.

TEXT BOOKS:

Padiyar,K.R.,"HVDC power transmission system", New Age International(P)Ltd. NewDelhi, Second Edition,2010.

Arrillaga,J.,"High Voltage Direct Current Transmission", Peter Pregrinus, London,1983.

REFERENCES

Kundur P.," Power System Stability and Control", McGraw-Hill,1993.

Colin Adamson and Hingorani NG," High Voltage Direct Current Power Transmission", Garraway Limited, London, 1960.

Edward Wilson Kimbark," Direct Current Transmission", Vol.I, Wiley inter science, New York, London, Sydney,1971.

EE8018 MICROCONTROLLER BASED SYSTEM DESIGN L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

Architecture of PIC microcontroller

Interrupts and timers

Peripheral devices for data communication and transfer Functional blocks of ARM processor

Architecture of ARM processors

UNIT I INTRODUCTION TO PIC MICROCONTROLLER 9

Introduction to PIC Microcontroller–PIC 16C6x and PIC16C7x Architecture–IC16cxx–- Pipelining - Program Memory considerations – Register File Structure - Instruction Set - Addressing modes – Simple Operations.

UNIT II INTERRUPTS AND TIMER 9

PIC micro controller Interrupts- External Interrupts-Interrupt Programming–Loop time subroutine Timers-Timer Programming– Front panel I/O-Soft Keys– State machines and key switches– Display of Constant and Variability strings.

UNIT III PERIPHERALS AND INTERFACING 9

I^2C Bus for Peripherals Chip Access– Bus operation-Bus subroutines– Serial EEPROM— Analog to Digital Converter–UART-Baud rate selection–Data handling circuit–Initialization - 131

LCD and keyboard Interfacing -ADC, DAC, and Sensor Interfacing.

UNIT IV INTRODUCTION TO ARM PROCESSOR 9

Architecture –ARM programmer's model –ARM Development tools- Memory Hierarchy – ARM Assembly Language Programming–Simple Examples–Architectural Support for Operating systems.

UNIT V ARM ORGANIZATION 9

3-Stage Pipeline ARM Organization– 5-Stage Pipeline ARM Organization–ARM Instruction Execution- ARM Implementation– ARM Instruction Set– ARM coprocessor interface– Architectural support for High Level Languages – Embedded ARM Applications.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand and apply computing platform and software for engineering problems.

Ability to understand the concepts of Architecture of PIC microcontroller

Ability to acquire knowledge on Interrupts and timers.

Ability to understand the importance of Peripheral devices for data communication.

Ability to understand the basics of sensor interfacing

Ability to acquire knowledge in Architecture of ARM processors

TEXT BOOKS:

Peatman,J.B., "Design with PIC Micro Controllers"PearsonEducation,3rdEdition, 2004.

Furber,S., "ARM System on Chip Architecture" Addison Wesley trade Computer Publication,2000.

REFERENCES

Mazidi, M.A.,"PIC Microcontroller" Rollin Mckinlay, Danny causey ,Prentice Hall of India, 2007.

EE8019 SMART GRID L T P C 3003

OBJECTIVES: To impart knowledge about the following topics:

Smart Grid technologies, different smart meters and advanced metering infrastructure. The power quality management issues in Smart Grid.

The high performance computing for Smart Grid applications

UNIT I INTRODUCTION TO SMART GRID 9

Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, National and International Initiatives in Smart Grid.

UNIT II SMART GRID TECHNOLOGIES 9 Technology Drivers, Smart energy resources, Smart substations, Substation Automation,
Feeder Automation ,Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Protection and control, Distribution systems: DMS, Volt/VAR control, Fault Detection, Isolation and service restoration, Outage management, High-Efficiency Distribution Transformers, Phase Shifting Transformers, Plugin Hybrid Electric Vehicles(PHEV).

UNIT III SMART METERS AND ADVANCED METERING INFRASTRUCTURE 9 IntroductiontoSmartMeters,AdvancedMeteringinfrastructure(AMI)driversandbenefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED)&their application for monitoring & protection.

UNIT IV POWER QUALITY MANAGEMENT IN SMART GRID 9
Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

UNIT V HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS 9
Local Area Network(LAN),House Area Network(HAN), Wide Area Network(WAN), Broad band over Power line(BPL),IP based Protocols, Basics of Web Service and CLOUD Computing to make Smart Grids smarter, Cyber Security for Smart Grid.

TOTAL : 45 PERIODS

OUTCOMES:

Learners will develop more understanding on the concepts of Smart Grid and its present developments.
Learners will study about different Smart Grid technologies.
Learners will acquire knowledge about different smart meters and advanced metering infrastructure.
Learners will have knowledge on power quality management in Smart Grids
Learners will develop more understanding on LAN, WAN and Cloud Computing for Smart Grid applications.

TEXT BOOKS:

Stuart Borlase "Smart Grid: Infrastructure, Technology and Solutions",CRCPress2012.
JanakaEkanayake,NickJenkins,KithsiriLiyanage,JianzhongWu,AkihikoYokoyama, "Smart Grid: TechnologyandApplications",Wiley2012.

VehbiC. Güngör ,Dilan Sahin, Taskin Kocak, Salih Ergüt, Concettina Buccella, Carlo Cecati, and Gerhard P. Hancke, "Smart Grid Technologies: Communication Technologies and Standards" IEEE Transactions On Industrial Informatics, Vol.7,No.4, November2011.
Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang"SmartGrid –The New and Improved Power Grid: A Survey" ,IEEE Transaction on Smart Grids,vol.14,2012.
James Momohe "Smart Grid: Fundamentals of Design and Analysis,", Wiley-IEEE Press , 2012.

EI8073 BIOMEDICAL INSTRUMENTATION LTPC

300 3

OBJECTIVES:

- **To Introduce Fundamentals of Biomedical Engineering**
- **To study the communication mechanics in a biomedical system with few examples**
- **To study measurement of certain important electrical and non-electrical parameters**
- **To understand the basic principles in imaging techniques**
- **To have a basic knowledge in life assisting and therapeutic devices**

UNIT I FUNDAMENTALS OF BIOMEDICAL ENGINEERING 9

Cell and its structure – Resting and Action Potential – Nervous system and its fundamentals - Basic components of a biomedical system- Cardiovascular systems- Respiratory systems - Kidney and blood flow - Biomechanics of bone - Biomechanics of soft tissues -Physiological signals and transducers - Transducers – selection criteria – Piezo electric, ultrasonic transducers - Temperature measurements - Fibre optic temperature sensors

UNIT II NON ELECTRICAL PARAMETERS MEASUREMENT AND DIAGNOSTIC PROCEDURES 9

Measurement of blood pressure - Cardiac output - Heart rate - Heart sound - Pulmonary function measurements – spirometer – Photo Plethysmography, Body Plethysmography – Blood Gas analysers, pH of blood –measurement of blood pCO2, pO2, finger-tip oxymeter - ESR, GSR measurements.

UNIT III ELECTRICAL PARAMETERS ACQUISITION AND ANALYSIS 9

Electrodes – Limb electrodes –floating electrodes – pregelled disposable electrodes - Micro, needle and surface electrodes – Amplifiers, Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier - ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms - Electrical safety in medical environment, shock hazards – leakage current-Instruments for checking safety parameters of biomedical equipment.

UNIT IV IMAGING MODALITIES AND ANALYSIS 9

Radio graphic and fluoroscopic techniques – Computer tomography – MRI – Ultrasonography – Endoscopy – Thermography –Different types of biotelemetry systems - Retinal Imaging - Imaging application in Biometric systems.

UNIT V LIFE ASSISTING, THERAPEUTIC AND ROBOTIC DEVICES 9

Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart – Lung machine – Audio meters – Dialysers – Lithotripsy - ICCU patient monitoring system - Nano Robots - Robotic surgery –Orthopedic prostheses fixation.

TOTAL : 45 PERIODS

OUTCOMES: At the end of the course students will have the

Ability to understand the philosophy of the heart, lung, blood circulation and respirationsystem. Ability to provide latest ideas on devices of non-electrical devices.

Ability to gain knowledge on various sensing and measurement devices of electrical origin. Ability to understand the analysis systems of various organ types.

Ability to bring out the important and modern methods of imaging techniques and their

analysis.

Ability to explain the medical assistance/techniques, robotic and therapeutic equipments.

TEXT BOOKS:

Leslie Cromwell, "Biomedical Instrumentation and Measurement", Prentice Hall of India, New Delhi, 2007.

Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, New Delhi,2nd edition, 2003

Joseph J Carr and John M.Brown, Introduction to Biomedical Equipment Technology, John Wiley and sons, New York, 4th edition, 2012

REFERENCES

John G. Webster, Medical Instrumentation Application and Design, John Wiley and sons, New York, 1998.

Duane Knudson, Fundamentals of Biomechanics, Springer, 2nd Edition, 2007.

Suh, Sang, Gurupur, Varadraj P., Tanik, Murat M., Health Care Systems, Technology and Techniques, Springer, 1st Edition, 2011.

Ed. Joseph D. Bronzino, The Biomedical Engineering Hand Book, Third Edition, Boca Raton, CRC Press LLC, 2006.

M.Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003.

GE8073 FUNDAMENTALS OF NANOSCIENCE LTPC

3 003

OBJECTIVES:

To learn about basis of nanomaterial science, preparation method, types and application

UNIT I INTRODUCTION 8

Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-

multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II GENERAL METHODS OF PREPARATION 9

Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III NANOMATERIALS 12

Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications- Nanometal oxides-ZnO, TiO2,MgO, ZrO2, NiO, nanoalumina, CaO, AgTiO2, Ferrites, Nanoclays-functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

UNIT IV CHARACTERIZATION TECHNIQUES 9

X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation.

UNIT V APPLICATIONS 7

NanoInfoTech: Information storage- nanocomputer, molecular switch, super chip, nanocrystal, Nanobiotechlogy: nanoprobes in medical diagnostics and biotechnology, Nano medicines, Targetted drug delivery, Bioimaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nanosensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sunbarrier products - In Photostat, printing, solar cell, battery.

TOTAL : 45 PERIODS

OUTCOMES:

Will familiarize about the science of nanomaterials

Will demonstrate the preparation of nanomaterials

Will develop knowledge in characteristic nanomaterial

TEXT BOOKS :

1. A.S. Edelstein and R.C. Cammearata, eds., "Nanomaterials: Synthesis, Properties and Applications", Institute of Physics Publishing, Bristol and Philadelphia, 1996.

2. N John Dinardo, "Nanoscale Charecterisation of surfaces & Interfaces", 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000.

REFERENCES:

G Timp, "Nanotechnology", AIP press/Springer, 1999.

Akhlesh Lakhtakia,"The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations". Prentice-Hall of India (P) Ltd, New Delhi, 2007.

ANNA UNIVERSITY, CHENNAI
NON-AUTONOMOUS COLLEGES AFFILIATED TO
ANNA UNIVERSITY REGULATIONS 2021
CHOICE BASED
CREDIT SYSTEM
B. E. CIVIL ENGINEERING
CURRICULA AND SYLLABI FOR
SEMESTERI& II

SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
THEORY								
2.	HS3151	Professional English - I	HSMC	3	1	0	4	4
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3	0	0	3	3
5.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
6.	GE3151	Problem Solving and Python Programming	ESC	3	0	0	3	3
PRACTICALS								
7.	GE3171	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
8.	BS3171	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
			TOTAL	**15**	**2**	**8**	**25**	**21**

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	HS3251	Professional English - II	HSMC	3	1	0	4	4
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	PH3201	Physics for Civil Engineering	BSC	3	0	0	3	3
4.	BE3252	Basic Electrical, Electronics and	ESC	3	0	0	3	3
5.	GE3251	Engineering Graphics	ESC	2	0	4	6	4
6.		NCC Credit Course Level 1*	-	2	0	0	2	2
PRACTICALS								
7.	GE3271	Engineering Practices Laboratory	ESC	0	0	4	4	2

8.	BE3272	Basic Electrical, Electronics and Instrumentation Engineering	ESC	0	0	4	4	2
			TOTAL	**14**	**2**	**12**	**28**	**22**

*NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

IP3151 INDUCTION PROGRAMME

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc. (ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it everyday for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and

also enhance creativity which would, hopefully, grow into engineering design later. (iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's

and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.
Discussions would be conducted in small groups of about 20 students with a faculty
mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

Referenc
es:
Guide to Induction program from
AICTE

HS3151 PROFESSIONAL ENGLISH - I L T P C

3 1 0 4

OBJECTIVES :

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
- To use language efficiently in expressing their opinions via various media.

INTRODUCTION TO EFFECTIVE COMMUNICATION 1

What is effective communication? (There are many interesting activities for this.)

Why is communication critical for excellence during study, research and work?

What are the seven C's of effective communication?

What are key language skills?

What is effective listening? What does it involve?

What is effective speaking?
What does it mean to be an excellent reader? What should you be able to do? What is effective writing?
How does one develop language and communication skills?
What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

UNIT I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 11

Listening –for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form
Speaking - Self Introduction; Introducing a friend; Conversation - politeness strategies; Telephone conversation; Leave a voicemail; Leave a message with another person; asking for information to fill details in a form.
Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails.
Writing - Writing emails / letters introducing oneself
Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags
Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II NARRATION AND SUMMATION 12

Listening - Listening to podcast, anecdotes / stories / event narration; documentaries and interviews with celebrities.
Speaking - Narrating personal experiences / events; Interviewing a celebrity; Reporting / and summarising of documentaries / podcasts/ interviews.

Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs.
Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.)
Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions
Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

UNIT III DESCRIPTION OF A PROCESS / PRODUCT
12

Listening - Listen to a product and process descriptions; a classroom lecture;and advertisements about a products.
Speaking – Picture description; Giving instruction to use the product; Presenting a product; and
Summarising a lecture.
Reading – Reading advertisements, gadget reviews; user manuals.
Writing - Writing definitions; instructions; and Product /Process description.
Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives
& sequence words)

UNIT IV CLASSIFICATION AND RECOMMENDATIONS
12

Listening – Listening to TED Talks; Scientific lectures; and educational videos. Speaking – Small Talk; Mini presentations and making recommendations.
Reading – Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc,.)
Writing – Note-making / Note-taking (*Study skills to be taught, not tested); ; Writing
recommendations; Transferring information from non verbal (chart , graph etc, to verbal mode) Grammar – Articles; Pronouns - Possessive & Relative pronouns.
Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT V EXPRESSION
12

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions.
Speaking –group discussions, Debates, and Expressing opinions through Simulations & Roleplay.
Reading – Reading editorials; and Opinion
Blogs; Writing – Essay Writing (Descriptive or narrative).
Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences.
Vocabulary - Cause & Effect Expressions – Content vs Function words.

TOTAL : 60 PERIODS

OUTCOMES :

At the end of the course, learners will be able

- To listen and comprehend complex academic texts
- To read and infer the denotative and connotative meanings of technical texts
- To write definitions, descriptions, narrations and essays on various topics
- To speak fluently and accurately in formal and informal communicative contexts
- To express their opinions effectively in both oral and written medium of communication

TEXT BOOKS :

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3. English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi,2003.

MA3151 MATRICES AND CALCULUS L T P C

3 1 0 4

OBJECTIVES :

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNITI MATRICES 9+3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications : Stretching of an elastic membrane.

UNITII DIFFERENTIAL CALCULUS 9+3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications : Maxima and Minima of functions of one variable.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9+3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series

for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNITIV INTEGRAL CALCULUS 9+3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration : Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications : Hydrostatic force and pressure, moments and centres of mass.

UNITV MULTIPLE INTEGRALS 9+3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications : Moments and centres of mass, moment of inertia.

TOTAL : 60 PERIODS

OUTCOMES :

At the end of the course the students will be able to

- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Able to use differential calculus ideas on several variable functions.
- Apply different methods of integration in solving practical problems.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS :

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3. James Stewart, "Calculus : Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :

1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
2. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan. S. and Manicavachagom Pillai. T. K.,"Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, " Engineering Mathematics " Oxford University

Press,
2015.

7. Thomas. G. B., Hass. J, and Weir. M.D, " Thomas Calculus ", 14th Edition, Pearson India,
2018.

PH3151 ENGINEERING PHYSICS L T P C

3 0 0 3

OBJECTIVES:

- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to be successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNITI MECHANICS
9

Multiparticle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

UNIT II ELECTROMAGNETIC WAVES
9

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium- vacuum interface for normal incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS
9

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference –Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO_2 laser, semiconductor laser –Basic applications of lasers in industry.

UNIT IV BASIC QUANTUM MECHANICS
9

Photons and light waves - Electrons and matter waves –Compton effect - The

Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.

UNIT V APPLIED QUANTUM MECHANICS 9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

TOTAL : 45 PERIODS

OUTCOMES:

After completion of this course, the students should be able to

- Understand the importance of mechanics.
- Express their knowledge in electromagnetic waves.
- Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
- Understand the importance of quantum physics.
- Comprehend and apply quantum mechanical principles towards the formation of energy bands.

TEXT BOOKS:

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw- Hill (Indian Edition), 2017.

REFERENCES:

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer- Verlag, 2012.

CY3151 ENGINEERING CHEMISTRY L T P C

3 0 0 3

OBJECTIVES:

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.

- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

UNIT I WATER AND ITS TREATMENT
9

Water: Sources and impurities, **Water quality parameters:** Definition and significance of- colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. **Municipal**
water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination)**.**
Desalination of brackish water: Reverse Osmosis. **Boiler troubles:** Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. **Treatment of boiler feed water**: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment
– Ion exchange demineralisation and zeolite
process.

UNIT II NANOCHEMISTRY
9

Basics: Distinction between molecules, nanomaterials and bulk materials; **Size-dependent properties** (optical, electrical, mechanical and magnetic); **Types of nanomaterials**: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. **Preparation of nanomaterials:** sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. **Applications** of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT III PHASE RULE AND COMPOSITES
9

Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process.
Composites: Introduction: Definition & Need for composites; **Constitution**: Matrix materials
(Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). **Properties and applications of**: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. **Hybrid composites** - definition and examples.

UNIT IV FUELS AND COMBUSTION
9

Fuels: Introduction: Classification of fuels; **Coal and coke**: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). **Petroleum and Diesel:** Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; **Power alcohol and biodiesel.**
Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; **Ignition temperature**: spontaneous ignition temperature, Explosive
range; **Flue gas analysis** - ORSAT Method. **CO_2 emission and carbon foot print.**

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Stability of nucleus: mass defect (problems), binding energy;Nuclear energy: light water nuclear power plant, breeder reactor. **Solar energy conversion:** Principle, working and applications of solar cells**; Recent developments in solar cell materials. Wind energy; Geothermal energy;Batteries:** Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion-battery; **Electric vehicles-working principles; Fuel cells:** H_2-O_2 fuel cell, microbial fuel cell; **Supercapacitors:** Storage principle, types and examples.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students will be able:

- To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
- To apply the knowledge of phase rule and composites for material selection requirements.
- To recommend suitable fuels for engineering processes and applications.
- To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

GE3151 PROBLEM SOLVING AND PYTHON PROGRAMMING

L T P C

3 0 0 3

OBJECTIVES:

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING
9

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS
9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS
9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES
9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

UNIT V FILES, MODULES, PACKAGES
9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems. CO2: Develop and execute simple Python programs.**TOTAL : 45 PERIODS**
CO3: Write simple Python programs using conditionals and looping for solving problems. CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries etc.
CO6: Read and write data from/to files in Python programs.

TEXT BOOKS:

1. Allen B. Downey, “Think Python : How to Think like a Computer Scientist”, 2nd Edition,
O’Reilly Publishers, 2016.
2. Karl Beecher, “Computational Thinking: A Beginner's Guide to Problem Solving and programming”, 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, “Computational Thinking: A Primer for Programmers
and Data Scientists”, 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With
Applications to Computational Modeling and Understanding Data‘‘, Third Edition, MIT Press
2021
4. Eric Matthes, “Python Crash Course, A Hands - on Project Based Introduction to
Programming”, 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill,2018.

HS3251 PROFESSIONAL ENGLISH - II L T P C

3 1 0 4

OBJECTIVES :

- To engage learners in meaningful language activities to improve their LSRW skills
- To enhance learners’ awareness of general rules of writing for specific audiences
- To help learners understand the purpose, audience, contexts of different types of writing
- To develop analytical thinking skills for problem solving in communicative contexts
- To demonstrate an understanding of job applications and interviews for internship and placements

UNIT I MAKING COMPARISONS 12

Listening – Evaluative Listening: Advertisements, Product Descriptions, -Audio / video; Listening and filling a Graphic Organiser (Choosing a product or service by comparison) Speaking – Marketing a product, Persuasive Speech Techniques. Reading - Reading advertisements, user manuals, brochures; Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases Vocabulary – Contextual meaning of words

UNIT II EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING 12

Listening - Listening to longer technical talks and completing– gap filling exercises.

Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects - Speaking – Describing and discussing the reasons of accidents or disasters based on news reports.
Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint,
Writing - Writing responses to complaints.
Grammar - Active Passive Voice transformations, Infinitive and Gerunds Vocabulary – Word Formation (Noun-Verb-Adj-Adv), Adverbs.

UNIT III PROBLEM SOLVING 12

Listening – Listening to / Watching movie scenes/ documentaries depicting a technical problem and suggesting solutions.
Speaking – Group Discussion(based on case studies), - techniques and Strategies,
Reading - Case Studies, excerpts from literary texts, news reports etc.,
Writing – Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay
Grammar -– Error correction; If conditional sentences
Vocabulary - Compound Words, Sentence Completion.

UNIT IV REPORTING OF EVENTS AND RESEARCH 12

Listening – Listening Comprehension based on news reports – and documentaries – Precis writing, Summarising, Speaking –Interviewing, Presenting an oral report, Mini presentations on select topics; Reading –Newspaper articles; Writing – Recommendations, Transcoding, Accident Report, Survey Report Grammar – Reported Speech, Modals Vocabulary – Conjunctions- use of prepositions

UNIT V THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY 12

Listening – Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance); Speaking – Participating in a Role play, (interview/telephone interview), virtual interviews, Making presentations with visual aids; Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses Vocabulary – Idioms.

TOTAL : 60 PERIODS

OUTCOMES:
At the end of the course, learners will be able

- To compare and contrast products and ideas in technical texts.
- To identify cause and effects in events, industrial processes through technical texts
- To analyse problems in order to arrive at feasible solutions and communicate them orally and in the written format.
- To report events and the processes of technical and industrial nature.
- To present their opinions in a planned and logical manner, and draft effective resumes in context of job search.

TEXT BOOKS :

1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd.
   Department of English, Anna University.
2. English for Science & Technology Cambridge University Press 2021.
   Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN.
   Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, NewDelhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd.
   1990, Delhi.

MA3251 STATISTICS AND NUMERICAL METHODS L T P C

3 1 0 4

OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 9+3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS 9+3

One way and two way classifications - Completely randomized design – Randomized block design

– Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9+3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to:

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.
- Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning,

New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New
Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., " Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and
Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

PH3201 PHYSICS FOR CIVIL ENGINEERING L T P C

3 0 0 3

OBJECTIVES:

- To introduce the basics of heat transfer through different materials, thermal performance of building and various thermal applications
- To impart knowledge on the ventilation and air conditioning of buildings
- To introduce the concepts of sound insulation and lighting designs
- To give an introduction to the processing and applications of new engineering materials
- To create an awareness on natural disasters and safety measures

UNIT I THERMAL APPLICATIONS 9

Principles of heat transfer, steady state of heat flow, conduction through compound media-series and parallel-conductivity of rubber tube and powder materials - heat transfer through fenestrations, thermal insulation and its benefits - heat gain and heat loss estimation - factors affecting the thermal performance of buildings, thermal measurements, thermal comfort, indices of thermal comfort, climate and design of solar radiation, shading devices - central heating.

UNIT II VENTILATION AND REFRIGERATION 9

Requirements, principles of natural ventilation - ventilation measurements, design for natural ventilation - Window types and packaged air conditioners - chilled water plant - fan coil systems - water piping - cooling load - Air conditioning systems for different types of buildings - Protection against fire to be caused by A.C.Systems.

UNIT III ACOUSTICS AND LIGHTING DESIGNS 9

Methods of sound absorptions - absorbing materials - noise and its measurements, sound insulation and its measurements, impact of noise in multistored buildings. Visual field glare, colour
- day light calculations - day light design of windows, measurement of day-light and use of models and artificial skies, principles of artificial lighting, supplementary artificial lighting.

UNIT IV NEW ENGINEERING MATERIALS

9

Composites - Definition and Classification - Fibre reinforced plastics (FRP) and fiber reinforced metals (FRM) - Metallic glasses - Shape memory alloys - Ceramics - Classification - Crystalline - Non Crystalline - Bonded ceramics, Manufacturing methods - Slip casting - Isostatic pressing - Gas pressure bonding - Properties - thermal, mechanical, electrical and chemical ceramic fibres - ferroelectric and ferromagnetic ceramics - High Aluminium ceramics.

UNIT V NATURAL DISASTERS

9

Seismology and Seismic waves - Earth quake ground motion - Basic concepts and estimation techniques - site effects - Probabilistic and deterministic Seismic hazard analysis - Cyclone and flood hazards - Fire hazards and fire protection, fire-proofing of materials, fire safety regulations and firefighting equipment - Prevention and safety measures.

TOTAL: 45 PERIODS

OUTCOMES:

After completion of the course, the students should be able to

- acquire knowledge about heat transfer through different materials, thermal performance of building and thermal insulation.
- gain knowledge on the ventilation and air conditioning of buildings
- understand the concepts of sound absorption, noise insulation and lighting designs
- know about the processing and applications of composites, metallic glasses, shape memory alloys and ceramics
- get an awareness on natural disasters such as earth quake, cyclone, fire and safety measures

TEXT BOOKS:

1. Marko Pinteric, Building Physics, Springer 2017.
2. D.S.Mathur. Elements of Properties of Matter. S Chand & Company , 2010.
3. Hugo Hens, Building Physics: Heat, Air and Moisture, Wiley, 2017

REFERENCES:

1. W.R.Stevens. Building Physics: Lighting. Pergamon Press, 2013..
2. Hugo Hens, Applied Building Physics, Wiley, 2016
3. K.G.Budinski and M.K.Budinski. Engineering Materials: Properties and Selection. Pearson Education, 2016.
4. Peter A. Claisse, Civil Engineering Materials, Elsevier, 2016.
5. Patrick L. Abbott, Natural Disasters, McGraw-Hill, 2017.

BE3252 BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES :

- To introduce the basics of electric circuits and analysis
- To impart knowledge in domestic wiring
- To impart knowledge in the basics of working principles and application of

electrical machines

- To introduce analog devices and their characteristics
- To introduce the functional elements and working of sensors and transducers.

UNIT I ELECTRICAL CIRCUITS
9

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws – Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state)

Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state

analysis of RLC circuits (Simple problems only), Three phase supply – star and delta connection – power in three-phase systems

UNIT II MAGNETIC CIRCUITS AND ELECTRICAL INSTALLATIONS
9

Magnetic circuits-definitions-MMF, flux, reluctance, magnetic field intensity, flux density, fringing, self and mutual inductances-simple problems.

Domestic wiring , types of wires and cables, earthing ,protective devices- switch fuse unit-

Miniature circuit breaker-moulded case circuit breaker- earth leakage circuit breaker, safety precautions and First Aid

.

UNIT III ELECTRICAL MACHINES
9

Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.

UNIT IV ANALOG ELECTRONICS
9

Resistor, Inductor and Capacitor in Electronic Circuits- Semiconductor Materials: Silicon

&Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications – Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET,IGBT – Types, I-V Characteristics and Applications, Rectifier and Inverters, harmonics

UNIT V SENSORS AND TRANSDUCERS
9

Sensors, solenoids, pneumatic controls with electrical actuator, mechatronics, types of valves and its applications, electro-pneumatic systems, proximity sensors, limit switches, piezoelectric, hall effect, photo sensors,Strain gauge, LVDT, differential pressure transducer,optical and digital transducers, Smart sensors, Thermal Imagers.

TOTAL: 45 PERIODS

OUTCOMES :

After completing this course, the students will be able to

CO1: Compute the electric circuit parameters for simple problems
CO2: Explain the concepts of domestics wiring and protective devices

CO3: Explain the working principle and applications of electrical machines **CO4:** Analyze the characteristics of analog electronic devices
CO5: Explain the types and operating principles of sensors and transducers

TEXT BOOKS:

1. D P Kothari and I.J Nagarath, "Basic Electrical and Electronics Engineering", McGraw Hill Education (India) Private Limited, Second Edition, 2020
2. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.
3. S.K. Bhattacharya, Basic Electrical Engineering, Pearson Education, 2019
4. James A Svoboda, Richard C. Dorf, Dorf's Introduction to Electric Circuits, Wiley,2018

REFERENCES:

1. John Bird, "Electrical Circuit theory and technology", Routledge; 2017.
2. Thomas L. Floyd, 'Electronic Devices', 10th Edition, Pearson Education, 2018.
3. Albert Malvino, David Bates, '**Electronic Principles**, McGraw Hill Education; 7th edition, 2017
4. Muhammad H.Rashid, "Spice for Circuits and electronics", 4th Edition., Cengage India,2019.
5. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

GE3251 ENGINEERING GRAPHICS L T P C

2 0 4 4

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

1. Drawing engineering curves.
2. Drawing freehand sketch of simple objects.
3. Drawing orthographic projection of solids and section of solids.
4. Drawing development of solids
5. Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications — Use of drafting instruments — BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING 6+12

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid —

construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE
6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS
6+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles — Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.

Practicing three dimensional modeling of simple objects by CAD Software(Not for examination)

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES
6+12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.

Practicing three dimensional modeling of simple objects by CAD Software(Not for examination)

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS
6+12

Principles of isometric projection — isometric scale —lsometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

Practicing three dimensional modeling of isometric projection of simple objects by CAD Software(Not for examination)

TOTAL: (L=30+P=60) 90 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

- Use BIS conventions and specifications for engineering drawing.
- Construct the conic curves, involutes and cycloid.
- Solve practical problems involving projection of lines.
- Draw the orthographic, isometric and perspective projections of simple solids.
- Draw the development of simple solids.

TEXT BOOKS:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House,
53 Edition, 2019.

2. Natrajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai,
2018.
3. Parthasarathy, N. S. and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015

REFERENCES:

1. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, McGraw Hill, 2nd Edition, 2019.
2. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
3. Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an
introduction to Interactive Computer Graphics for Design and Production, Eastern Economy
Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. Parthasarathy N. S. and Vela Murali, “Engineering Graphics”, Oxford University, Press, New
Delhi, 2015.
5. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson Education India, 2nd Edition,
2009.
6. Venugopal K. and Prabhu Raja V., “Engineering Graphics", New Age International (P) Limited,
2008.

Publication of Bureau of Indian Standards:

1. IS 10711 — 2001: Technical products Documentation — Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) — 2001: Technical products Documentation — Lettering.
3. IS 10714 (Part 20) — 2001 & SP 46 — 2003: Lines for technical drawings.
4. IS 11669 — 1986 & SP 46 —2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) — 2001: Technical drawings — Projection Methods.

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. CIVIL ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) :

To prepare students for successful careers in Civil Engineering field that meets the needs of Indian and multinational companies.

To develop the confidence and ability among students to synthesize data and technical concepts and thereby apply it in real world problems.

To develop students to use modern techniques, skill and mathematical engineering tools for solving problems in Civil Engineering.

IV. To provide students with a sound foundation in mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyse engineering problems and to prepare them for graduate studies.

To promote students to work collaboratively on multi-disciplinary projects and make them engage in life-long learning process throughout their professional life.

PROGRAMME OUTCOMES (POs):

On successful completion of the programme,

Graduates will demonstrate knowledge of mathematics, science and engineering.

Graduates will demonstrate an ability to identify, formulate and solve engineering problems.

Graduate will demonstrate an ability to design and conduct experiments, analyze and interpret data.

Graduates will demonstrate an ability to design a system, component or process as per needs and specifications.

Graduates will demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks.

Graduate will demonstrate skills to use modern engineering tools, software and equipment to analyze problems.

Graduates will demonstrate knowledge of professional and ethical responsibilities.

Graduate will be able to communicate effectively in both verbal and written form.

Graduate will show the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues.

Graduate will develop confidence for self education and ability for life-long learning.

PEOs & POs

The B.E. Civil Engineering Program outcomes leading to the achievement of the objectives are summarized in the following Table.

Programme Educational Objectives	Programme Outcomes									
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**
I	X	X		X	X					
II		X	X							
III				X			X			
IV	X				X					
V						X		X	X	X

			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
YEAR 1	SEM 1	Communicative English				✓				✓		
		Engineering Mathematics – I	✓									
		Engineering Physics	✓	✓	✓	✓	✓	✓				
		Engineering Chemistry	✓	✓	✓		✓	✓	✓			
		Problem Solving and Python Programming	✓	✓			✓	✓	✓			
		Engineering Graphics	✓	✓	✓		✓	✓	✓		✓	✓
		Problem Solving and Python Programming Laboratory	✓	✓			✓	✓	✓			
		Physics and Chemistry Laboratory	✓	✓			✓	✓	✓			
	SEM 2	Technical English				✓				✓		
		Engineering Mathematics – II	✓									
		Physics for Civil Engineering	✓	✓	✓	✓	✓	✓				
		Basic Electrical and Electronics Engineering										
		Environmental Science and Engineering							✓		✓	
		Engineering Mechanics	✓	✓	✓		✓	✓	✓		✓	✓
		Engineering Practices Laboratory	✓	✓				✓	✓			
		Computer Aided Building Drawing										
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
YEAR 2	SEM 3	Transforms and Partial Differential Equations										
		Engineering Geology		✓	✓		✓		✓			✓
		Construction Materials		✓	✓		✓		✓			✓
		Strength of Materials I	✓	✓	✓	✓	✓					✓
		Fluid Mechanics	✓	✓		✓			✓	✓	✓	✓
		Surveying		✓	✓		✓		✓			✓
		Surveying Laboratory										
		Construction Materials Laboratory										

		Interpersonal Skills / Listening and Speaking										
	SEM 4	Numerical Methods										
		Construction Techniques and Practices		✓			✓		✓		✓	✓
		Strength of Materials II	✓	✓	✓	✓	✓					✓
		Applied Hydraulic Engineering	✓	✓		✓			✓	✓	✓	✓
		Concrete Technology	✓	✓		✓			✓	✓	✓	✓
		Soil Mechanics	✓	✓					✓	✓	✓	✓
		Strength of Materials Laboratory	✓	✓	✓	✓	✓					✓
		Hydraulic Engineering Laboratory	✓		✓		✓	✓	✓	✓	✓	✓
		Advanced Reading and Writing										
			PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
YEAR 3	**SEM 5**	Design of Reinforced Cement Concrete Elements	✓	✓	✓	✓	✓					✓
		Foundation Engineering		✓		✓			✓		✓	✓
		Structural Analysis I	✓	✓	✓	✓	✓				✓	✓
		Water Supply Engineering			✓	✓	✓	✓			✓	
		Open Elective- I*										
		Professional Elective I										
		Water and Waste Water Analysis Laboratory		✓		✓			✓			✓
		Soil Mechanics Laboratory			✓		✓	✓				
		Survey Camp (2 weeks–During V Semester)			✓	✓					✓	
	SEM 6	Design of Steel Structural Elements	✓	✓	✓	✓	✓					✓
		Structural Analysis II	✓	✓	✓	✓	✓				✓	✓
		Irrigation Engineering	✓	✓		✓						
		Wastewater Engineering	✓	✓		✓						

		Highway Engineering		✓	✓	✓	✓			✓		
		Professional Elective II										
		Highway Engineering Laboratory								✓		
		Irrigation and Environmental Engineering Drawing										
		Professional Communication										
			PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
YEAR 4	Drawing	Estimation, Costing and Valuation Engineering	✓	✓				✓	✓			✓
		Railways, Airports, Docks and Harbour Engineering		✓		✓			✓		✓	✓
		Structural Design and	✓	✓	✓	✓		✓				✓
		SEM 7 Professional Elective III										
		Open Elective II*										
		Creative and Innovative Project (Activity Based - Subject Related)		✓		✓			✓			✓
		Industrial Training (4 weeks During VI semester–Summer)				✓			✓	✓		✓
	SEM 8	Professional Elective IV										
		Professional Elective V										
		Project Work		✓		✓			✓			✓

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. CIVIL ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM
I TO VIII SEMESTERS CURRICULA & SYLLABI

SEMESTER I

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	HS8151	Communicative English	HS	4	4	0	0	4
2	MA8151	Engineering Mathematics – I	BS	4	4	0	0	4
3	PH8151	Engineering Physics	BS	3	3	0	0	3
4	CY8151	Engineering Chemistry	BS	3	3	0	0	3
5	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
6	GE8152	Engineering Graphics	ES	6	2	0	4	4
PRACTICALS								
7	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
8	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
			TOTAL	**31**	**19**	**0**	**12**	**25**

SEMESTER II

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8251	Technical English	HS	4	4	0	0	4
2.	MA8251	Engineering Mathematics – II	BS	4	4	0	0	4
3.	PH8201	Physics For Civil Engineering	BS	3	3	0	0	3
4.	BE8251	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3
5.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
6.	GE8292	Engineering Mechanics	ES	5	3	2	0	4
PRACTICALS								
7.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
8.	CE8211	Computer Aided Building Drawing	PC	4	0	0	4	2
			TOTAL	**30**	**20**	**2**	**8**	**25**

SEMESTER III

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
2.	CE8301	Strength of Materials I	PC	3	3	0	0	3
3.	CE8302	Fluid Mechanics	PC	3	3	0	0	3
4.	CE8351	Surveying	PC	3	3	0	0	3
5.	CE8391	Construction Materials	PC	3	3	0	0	3
6.	CE8392	Engineering Geology	ES	3	3	0	0	3
PRACTICALS								
7.	CE8311	Construction Materials Laboratory	PC	4	0	0	4	2
8.	CE8361	Surveying Laboratory	PC	4	0	0	4	2
9.	HS8381	Interpersonal Skills / Listening and Speaking	EEC	2	0	0	2	1
			TOTAL	**29**	**19**	**0**	**10**	**24**

SEMESTER IV

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8491	Numerical Methods	BS	4	4	0	0	4
2.	CE8401	Construction Techniques and Practices	PC	3	3	0	0	3
3.	CE8402	Strength of Materials II	PC	3	3	0	0	3
4.	CE8403	Applied Hydraulic Engineering	PC	3	3	0	0	3
5.	CE8404	Concrete Technology	PC	3	3	0	0	3
6.	CE8491	Soil Mechanics	PC	3	3	0	0	3
PRACTICALS								
7.	CE8481	Strength of Materials Laboratory	PC	4	0	0	4	2
8.	CE8461	Hydraulic Engineering Laboratory	PC	4	0	0	4	2
9.	HS8461	Advanced Reading and Writing	EEC	2	0	0	2	1
			TOTAL	**29**	**19**	**0**	**10**	**24**

SEMESTER V

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	CE8501	Design of Reinforced Cement Concrete Elements	PC	5	3	2	0	4
2.	CE8502	Structural Analysis I	PC	3	3	0	0	3
3.	EN8491	Water Supply Engineering	PC	3	3	0	0	3
4.	CE8591	Foundation Engineering	PC	3	3	0	0	3
5.		Professional Elective I	PE	3	3	0	0	3
6.		Open Elective I*	OE	3	3	0	0	3
PRACTICALS								
7.	CE8511	Soil Mechanics Laboratory	PC	4	0	0	4	2
8.	CE8512	Water and Waste Water Analysis Laboratory	PC	4	0	0	4	2
9.	CE8513	Survey Camp (2 weeks –During IV Semester)	EEC	0	0	0	0	2
			TOTAL	**28**	**18**	**2**	**8**	**25**

SEMESTER VI

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	CE8601	Design of Steel Structural Elements	PC	5	3	2	0	4
2.	CE8602	Structural Analysis II	PC	3	3	0	0	3
3.	CE8603	Irrigation Engineering	PC	3	3	0	0	3
4.	CE8604	Highway Engineering	PC	3	3	0	0	3
5.	EN8592	Wastewater Engineering	PC	3	3	0	0	3
6.		Professional Elective II	PE	3	3	0	0	3
PRACTICALS								
7.	CE8611	Highway Engineering Laboratory	PC	4	0	0	4	2
8.	CE8612	Irrigation and Environmental Engineering Drawing	PC	4	0	0	4	2
9.	HS8581	Professional Communication	EEC	2	0	0	2	1
			TOTAL	**30**	**18**	**2**	**10**	**24**

SEMESTER VII

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	CE8701	Estimation, Costing and Valuation Engineering	PC	3	3	0	0	3
2.	CE8702	Railways, Airports, Docks and Harbour Engineering	PC	3	3	0	0	3
3.	CE8703	Structural Design and Drawing	PC	5	3	0	2	4
4.		Professional Elective III	PE	3	3	0	0	3
5.		Open Elective II*	OE	3	3	0	0	3
PRACTICALS								
6.	CE8711	Creative and Innovative Project (Activity Based - Subject Related)	EEC	4	0	0	4	2
7.	CE8712	Industrial Training (4 weeks During VI Semester – Summer)	EEC	0	0	0	0	2
			TOTAL	**21**	**15**	**0**	**6**	**20**

SEMESTER VIII

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Professional Elective IV	PE	3	3	0	0	3
2.		Professional Elective V	PE	3	3	0	0	3
PRACTICALS								
3.	CE8811	Project Work	EEC	20	0	0	20	10
			TOTAL	**26**	**6**	**0**	**20**	**16**

TOTAL NO. OF CREDITS: 183

*Course from the curriculum of other UG Programmes.

HUMANITIES AND SOCIAL SCIENCES (HS)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	HS8251	Technical English	HS	4	4	0	0	4
3.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3

BASIC SCIENCES (BS)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA8151	Engineering Mathematics – I	BS	4	4	0	0	4
2.	PH8151	Engineering Physics	BS	3	3	0	0	3
3.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
4.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
5.	MA8251	Engineering Mathematics – II	BS	4	4	0	0	4
6.	PH8201	Physics for Civil Engineering	BS	3	3	0	0	3
7.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
8.	MA8491	Numerical Methods	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
2.	GE8152	Engineering Graphics	ES	6	2	0	4	4
GE8161	Problem	Solving and Python Programming Laboratory	ES	4	0	0	4	2
4.	BE8251	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3
5.	GE8292	Engineering Mechanics	ES	5	3	2	0	4
6.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
7.	CE8392	Engineering Geology	ES	3	3	0	0	3

PROFESSIONAL CORE (PC)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CE8211	Computer Aided Building Drawing	PC	4	0	0	4	2
2.	CE8391	Construction Materials	PC	3	3	0	0	3
3.	CE8301	Strength of Materials I	PC	3	3	0	0	3
4.	CE8302	Fluid Mechanics	PC	3	3	0	0	3
5.	CE8351	Surveying	PC	3	3	0	0	3

CE8481	Strength of Materials Laboratory	PC	4	0	0	4	2
CE8361	Surveying Laboratory	PC	4	0	0	4	2
CE8311	Construction Materials Laboratory	PC	4	0	0	4	2
CE8401	Construction Techniques and Practices	PC	3	3	0	0	3
CE8402	Strength of Materials II	PC	3	3	0	0	3
CE8403	Applied Hydraulic Engineering	PC	3	3	0	0	3
CE8404	Concrete Technology	PC	3	3	0	0	3
CE8491	Soil Mechanics	PC	3	3	0	0	3
CE8461	Hydraulic Engineering Laboratory	PC	4	0	0	4	2
CE8501	Design of Reinforced Cement Concrete Elements	PC	5	3	2	0	4
CE8502	Structural Analysis I	PC	3	3	0	0	3
CE8511	Soil Mechanics Laboratory	PC	4	0	0	4	2
CE8512	Water and Waste Water Analysis Laboratory	PC	4	0	0	4	2
CE8591	Foundation Engineering	PC	3	3	0	0	3
CE8601	Design of Steel Structural Elements	PC	5	3	2	0	4
CE8602	Structural Analysis II	PC	3	3	0	0	3
CE8603	Irrigation Engineering	PC	3	3	0	0	3
CE8604	Highway Engineering	PC	3	3	0	0	3
CE8611	Highway Engineering Laboratory	PC	4	0	0	4	2
CE8612	Irrigation and Environmental Engineering Drawing	PC	4	0	0	4	2
EN8592	Wastewater Engineering	PC	3	3	0	0	3
EN8491	Water Supply Engineering	PC	3	3	0	0	3
CE8701	Estimation, Costing and Valuation Engineering	PC	3	3	0	0	3
CE8702	Railways, Airports, Docks and Harbour Engineering	PC	3	3	0	0	3
CE8703	Structural Design and Drawing	PC	5	3	0	2	4

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.No	COURSE COURSE TITLE CODE	CATEGORY	CONTACT PERIODS	L	T	P	C
	HS8381 Interpersonal Skills / Listening and Speaking	EEC	2	0	0	2	1
	HS8461 Advanced Reading and Writing	EEC	2	0	0	2	1
	CE8513 Survey Camp (2 weeks – During IV Semester)	EEC	0	0	0	0	2
	HS8581 Professional Communication	EEC	2	0	0	2	1
	CE8711 Creative and Innovative Project (Activity Based - Subject Related)	EEC	4	0	0	4	2
	CE8712 Industrial Training (4 weeks During VI Semester – Summer)	EEC	0	0	0	0	2
	CE8811 Project Work	EEC	20	0	0	20	10

PROFESSIONAL ELECTIVE

SEMESTER V
ELECTIVE - I

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	GI8012	Digital Cadastre	PE	3	3	0	0	3
2.	GI8013	Advanced Surveying	PE	3	3	0	0	3
3.	GI8014	Geographic Information System	PE	3	3	0	0	3
4.	GI8015	Geoinformatics Applications for Civil Engineers	PE	3	3	0	0	3
5.	GI8491	Total Station and GPS Surveying	PE	3	3	0	0	3
6.	GE8071	Disaster Management	PE	3	3	0	0	3
7.	GE8074	Human Rights	PE	3	3	0	0	3

SEMESTER VI
ELECTIVE - II

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CE8001	Ground Improvement Techniques	PE	3	3	0	0	3
	CE8002	Introduction to Soil Dynamics and Machine Foundations	PE	3	3	0	0	3
3.	CE8003	Rock Engineering	PE	3	3	0	0	3
4.	CE8004	Urban Planning and Development	PE	3	3	0	0	3
5.	CE8005	Air Pollution and Control Engineering	PE	3	3	0	0	3
6.	GE8075	Intellectual Property Rights	PE	3	3	0	0	3

SEMESTER VII
ELECTIVE – III

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CE8006	Pavement Engineering	PE	3	3	0	0	3
2.	CE8007	Traffic Engineering and Management	PE	3	3	0	0	3
3.	CE8008	Transport and Environment	PE	3	3	0	0	3
4.	CE8009	Industrial Structures	PE	3	3	0	0	3
5.	CE8010	Environmental and Social Impact Assessment	PE	3	3	0	0	3
6.	CE8011	Design of Prestressed Concrete Structures	PE	3	3	0	0	3
7.	CE8012	Construction Planning and Scheduling	PE	3	3	0	0	3
8.	EN8591	Municipal Solid Waste Management	PE	3	3	0	0	3
9.	GE8077	Total Quality Management	PE	3	3	0	0	3
	GE8072	Foundation Skills In Integrated Product Development	PE	3	3	0	0	3

SEMESTER VIII
ELECTIVE – IV

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CE8013	Coastal Engineering	PE	3	3	0	0	3
2.	CE8014	Participatory Water Resources Management	PE	3	3	0	0	3
3.	CE8015	Integrated Water Resources Management	PE	3	3	0	0	3
4.	CE8016	Groundwater Engineering	PE	3	3	0	0	3
5.	CE8017	Water Resources Systems Engineering	PE	3	3	0	0	3
6.	CE8018	Geo-Environmental Engineering	PE	3	3	0	0	3
7.	CE8091	Hydrology and Water Resources Engineering	PE	3	3	0	0	3
8.	GE8076	Professional Ethics in Engineering	PE	3	3	0	0	3

SEMESTER VIII
ELECTIVE – V

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CE8019	Computer Aided Design of Structures	PE	3	3	0	0	3
2.	CE8020	Maintenance, Repair and Rehabilitation of Structures	PE	3	3	0	0	3
3.	CE8021	Structural Dynamics and Earthquake Engineering	PE	3	3	0	0	3
4.	CE8022	Prefabricated Structures	PE	3	3	0	0	3
5.	CE8023	Bridge Engineering	PE	3	3	0	0	3
6.	GE8073	Fundamentals of Nanoscience	PE	3	3	0	0	3

SUMMARY

S.No	Subject Area	Credits per Semester								Credits Total
		I	II	III	IV	V	VI	VII	VIII	
1	**HS**	4	7							**11**
2	**BS**	12	7	4	4					**27**
3	**ES**	9	9	3						**21**
4	**PC**		2	16	19	17	20	10		**84**
5	**PE**					3	3	3	6	**15**
6	**OE**					3		3		**6**
7	**EEC**			1	1	2	1	4	10	**19**
	Total	**25**	**25**	**24**	**24**	**25**	**24**	**20**	**16**	**183**
	Non-Credit/Mandatory									

HS8151 COMMUNICATIVE ENGLISH L T P C 400 4

OBJECTIVES:

To develop the basic reading and writing skills of first year engineering and technology students.

To help learners develop their listening skills, which will, enable them listen to lectures and comprehend them by asking questions; seeking clarifications.

To help learners develop their speaking skills and speak fluently in real contexts.

To help learners develop vocabulary of a general kind by developing their reading skills

UNIT I SHARING INFORMATION RELATED TO ONESELF/FAMILY& FRIENDS 12

Reading- short comprehension passages, practice in skimming-scanning and predicting- **Writing**- completing sentences- - developing hints. **Listening**- short texts- short formal and informal conversations. **Speaking-** introducing oneself - exchanging personal information- **Language development**- Wh- Questions- asking and answering-yes or no questions- parts of speech. **Vocabulary development-**- prefixes- suffixes- articles.- count/ uncount nouns.

UNIT II GENERAL READING AND FREE WRITING 12

Reading - comprehension-pre-reading-post reading- comprehension questions (multiple choice questions and /or short questions/ open-ended questions)-inductive reading- short narratives and descriptions from newspapers including dialogues and conversations (also used as short Listening texts)- register- **Writing** – paragraph writing- topic sentence- main ideas- free writing, short narrative descriptions using some suggested vocabulary and structures –**Listening**- telephonic conversations. **Speaking –** sharing information of a personal kind—greeting – taking leave- **Language development** – prepositions, conjunctions **Vocabulary development-** guessing meanings of words in context.

UNIT III GRAMMAR AND LANGUAGE DEVELOPMENT 12

Reading- short texts and longer passages (close reading) **Writing-** understanding text structure- use of reference words and discourse markers-coherence-jumbled sentences **Listening** – listening to longer texts and filling up the table- product description- narratives from different sources. **Speaking**- asking about routine actions and expressing opinions. **Language development**- degrees of comparison- pronouns- direct vs indirect questions- **Vocabulary development –** single word substitutes- adverbs.

UNIT IV READING AND LANGUAGE DEVELOPMENT 12

Reading- comprehension-reading longer texts- reading different types of texts- magazines **Writing**- letter writing, informal or personal letters-e-mails-conventions of personal email- **Listening**- listening to dialogues or conversations and completing exercises based on them. **Speaking-** speaking about oneself- speaking about one,s friend- **Language development-** Tenses- simple present-simple past- present continuous and past continuous- **Vocabulary development**- synonyms-antonyms- phrasal verbs

UNIT V EXTENDED WRITING 12

Reading- longer texts- close reading –**Writing**- brainstorming -writing short essays **–** developing an outline- identifying main and subordinate ideas- dialogue writing-**Listening** – listening to talks- conversations- **Speaking –** participating in conversations- short group conversations-**Language development**-modal verbs- present/ past perfect tense - **Vocabulary development**-collocations- fixed and semi-fixed expressions

OUTCOMES: At the end of the course, learners will be able to:

Read articles of a general kind in magazines and newspapers.

Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.

Comprehend conversations and short talks delivered in English

Write short essays of a general kind and personal letters and emails in English.

TEXT BOOKS:

Board of Editors. **Using English** A Coursebook for Undergarduate Engineers and Technologists**.** Orient BlackSwan Limited, Hyderabad: 2015

Richards, C. Jack. **Interchange Students, Book-2** New Delhi: CUP, 2015.

REFERENCES

Bailey, Stephen. **Academic Writing: A practical guide for students**. New York: Rutledge,2011.

Comfort, Jeremy, et al. **Speaking Effectively: Developing Speaking Skills for Business English.** Cambridge University Press, Cambridge: Reprint 2011

Dutt P. Kiranmai and RajeevanGeeta. **Basic Communication Skills,** Foundation Books: 2013

Means,L. Thomas and Elaine Langlois. **English & Communication For Colleges.** CengageLearning ,USA: 2007

Redston, Chris &Gillies Cunningham **Face2Face** (Pre-intermediate Student,s Book& Workbook) Cambridge University Press, New Delhi: 2005

MA8151 ENGINEERING MATHEMATICS – I LTPC
4 0 0 4

OBJECTIVES :

The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT I DIFFERENTIAL CALCULUS 12

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12

Partial differentiation – Homogeneous functions and Euler,s theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor,s series for functions of two variables – Maxima and minima of functions of two variables – Lagrange,s method of undetermined multipliers.

UNIT III INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

UNIT V DIFFERENTIAL EQUATIONS 12

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler,s and Legendre,s type – System of simultaneous linear differential equations with constant coefficients - Method of undetermined coefficients.

TOTAL : 60 PERIODS

OUTCOMES :

After completing this course, students should demonstrate competency in the following skills:

Use both the limit definition and rules of differentiation to differentiate functions.

Apply differentiation to solve maxima and minima problems.

Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.

Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.

Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.

Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.

Apply various techniques in solving differential equations.

TEXT BOOKS:

Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.

James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015. [For Units I & III - Sections 1.1, 2.2, 2.3, 2.5, 2.7(Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1(Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES:

Anton, H, Bivens, I and Davis, S, "Calculus", Wiley, 10th Edition, 2016.

Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 3rd Edition, 2007.

Narayanan, S. and Manicavachagom Pillai, T. K., “Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.

Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.

Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016.

PH8151 ENGINEERING PHYSICS L T P C 3003

OBJECTIVES:

To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I PROPERTIES OF MATTER 9

Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT II WAVES AND FIBER OPTICS 9

Oscillatory motion – forced and damped oscillations: differential equation and its solution – plane progressive waves – wave equation. Lasers : population of energy levels, Einstein,s A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – losses associated with optical fibers - fibre optic sensors: pressure and displacement.

UNIT III THERMAL PHYSICS 9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conduction, convection and radiation – heat conductions in solids – thermal conductivity - Forbe,s and Lee,s disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT IV QUANTUM PHYSICS 9

Black body radiation – Planck,s theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger,s wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunnelling (qualitative) - scanning tunnelling microscope.

UNIT V CRYSTAL PHYSICS 9

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults – role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

TOTAL :45 PERIODS

OUTCOMES:

Upon completion of this course,

the students will gain knowledge on the basics of properties of matter and its applications,

the students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,

the students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,

the students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and

the students will understand the basics of crystals, their structures and different crystal growth techniques.

TEXT BOOKS:

Bhattacharya, D.K. & Poonam, T. “Engineering Physics”. Oxford University Press, 2015.

Gaur, R.K. & Gupta, S.L. “Engineering Physics”. Dhanpat Rai Publishers, 2012.

Pandey, B.K. & Chaturvedi, S. “Engineering Physics”. Cengage Learning India, 2012.

REFERENCES:

Halliday, D., Resnick, R. & Walker, J. “Principles of Physics”. Wiley, 2015.

Serway, R.A. & Jewett, J.W. “Physics for Scientists and Engineers”. Cengage Learning, 2010.

Tipler, P.A. & Mosca, G. “Physics for Scientists and Engineers with Modern Physics,. W.H.Freeman, 2007.

CY8151 ENGINEERING CHEMISTRY L T P C

3 0 0 3

OBJECTIVES:

To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.

To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.

Preparation, properties and applications of engineering materials.

Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT I WATER AND ITS TREATMENT 9

Hardness of water – types – expression of hardness – units – estimation of hardness of water by EDTA – numerical problems – boiler troubles (scale and sludge) – treatment of boiler feed water – Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) external treatment – Ion exchange process, zeolite process – desalination of brackish water - Reverse Osmosis.

UNIT II SURFACE CHEMISTRY AND CATALYSIS 9

Adsorption: Types of adsorption – adsorption of gases on solids – adsorption of solute from solutions – adsorption isotherms – Freundlich,s adsorption isotherm – Langmuir,s adsorption isotherm – contact theory – kinetics of surface reactions, unimolecular reactions, Langmuir - applications of adsorption on pollution abatement.

Catalysis: Catalyst – types of catalysis – criteria – autocatalysis – catalytic poisoning and catalytic promoters - acid base catalysis – applications (catalytic convertor) – enzyme catalysis– Michaelis – Menten equation.

UNIT III ALLOYS AND PHASE RULE 9

Alloys: Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Nichrome and stainless steel (18/8) – heat treatment of steel. Phase rule: Introduction, definition of terms with examples, one component system -water system - reduced phase rule - thermal analysis and cooling curves - two component systems - lead-silver system - Pattinson process.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - manufacture of synthetic petrol (Bergius process) - knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - power alcohol and biodiesel. Combustion of fuels: Introduction - calorific value - higher and lower calorific values- theoretical calculation of calorific value - ignition temperature - spontaneous ignition temperature - explosive range - flue gas analysis (ORSAT Method).

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant - breeder reactor - solar energy conversion - solar cells - wind energy. Batteries, fuel cells and supercapacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells – H_2-O_2 fuel cell.

TOTAL: 45 PERIODS

OUTCOMES:

The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

S. S. Dara and S. S. Umare, “A Textbook of Engineering Chemistry”, S. Chand & Company LTD, New Delhi, 2015

P. C. Jain and Monika Jain, “Engineering Chemistry” Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015

S. Vairam, P. Kalyani and Suba Ramesh, “Engineering Chemistry”, Wiley India PVT, LTD, New Delhi, 2013.

REFERENCES:

Friedrich Emich, “Engineering Chemistry”, Scientific International PVT, LTD, New Delhi, 2014.

Prasanta Rath, “Engineering Chemistry”, Cengage Learning India PVT, LTD, Delhi, 2015.

Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, 2015.

GE8151 PROBLEM SOLVING AND PYTHON PROGRAMMING LTPC 3003

OBJECTIVES:

To know the basics of algorithmic problem solving
To read and write simple Python programs.
To develop Python programs with conditionals and loops.
To define Python functions and call them.
To use Python data structures –- lists, tuples, dictionaries.
To do input/output with files in Python.

UNIT I ALGORITHMIC PROBLEM SOLVING 9

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

Develop algorithmic solutions to simple computational problems
Read, write, execute by hand simple Python programs.
Structure simple Python programs for solving problems.
Decompose a Python program into functions.
Represent compound data using Python lists, tuples, dictionaries.
Read and write data from/to files in Python Programs.

TEXT BOOKS:

Allen B. Downey, ‘‘Think Python: How to Think Like a Computer Scientist,,, 2nd edition, Updated for Python 3, Shroff/O,Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

Guido van Rossum and Fred L. Drake Jr, “An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

Charles Dierbach, “Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.

John V Guttag, “Introduction to Computation and Programming Using Python,,, Revised and expanded Edition, MIT Press , 2013

Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.

Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3”, Second edition, Pragmatic Programmers,LLC,2013.

Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.

Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd.,, 2015.

GE8152 ENGINEERING GRAPHICS L T P C
2 0 4 4

OBJECTIVES:

To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.

To expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination) 1

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING 7+12

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 5+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 5+12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method .

TOTAL: 90 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

familiarize with the fundamentals and standards of Engineering graphics

perform freehand sketching of basic geometrical constructions and multiple views of objects.

project orthographic projections of lines and plane surfaces.

draw projections and solids and development of surfaces.

visualize and to project isometric and perspective sections of simple solids.

TEXT BOOK:

Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.

Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2008.

REFERENCES:

Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.

Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2007.

Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

N S Parthasarathy And Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.

Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.

Publication of Bureau of Indian Standards:

IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.

IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.

IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.

IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.

IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

There will be five questions, each of either or type covering all units of the syllabus.

All questions will carry equal marks of 20 each making a total of 100.

The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.

The examination will be conducted in appropriate sessions on the same day

GE8161 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C
004 2

OBJECTIVES:

To write, test, and debug simple Python programs.
To implement Python programs with conditionals and loops.
Use functions for structuring Python programs.
Represent compound data using Python lists, tuples, dictionaries.
Read and write data **from/to files in Python.**

LIST OF PROGRAMS

1**.** Compute the GCD of two numbers.
Find the square root of a number (Newton,s method)
Exponentiation (power of a number)
Find the maximum of a list of numbers
Linear search and Binary search
Selection sort, Insertion sort
Merge sort
First n prime numbers
Multiply matrices
Programs that take command line arguments (word count)
Find the most frequent words in a text read from a file
Simulate elliptical orbits in Pygame
Simulate bouncing ball using Pygame

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

TOTAL : 60 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

Write, test, and debug simple Python programs.
Implement Python programs with conditionals and loops.
Develop Python programs step-wise by defining functions and calling them.
Use Python lists**,** tuples, dictionaries for representing compound data.
Read and write data from/to files in Python.

BS8161	**PHYSICS AND CHEMISTRY LABORATORY**	**L**	**T**	**P**	**C**
	(Common to all branches of B.E. / B.Tech Programmes)	**0**	**0**	**4**	**2**

OBJECTIVES:

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

Determination of rigidity modulus – Torsion pendulum
Determination of Young,s modulus by non-uniform bending method
(a) Determination of wavelength, and particle size using Laser
(b) Determination of acceptance angle in an optical fiber.
Determination of thermal conductivity of a bad conductor – Lee,s Disc method.
Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
Determination of wavelength of mercury spectrum – spectrometer grating

Determination of band gap of a semiconductor
Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

apply principles of elasticity, optics and thermal properties for engineering applications.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:

To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

To acquaint the students with the determination of molecular weight of a polymer by viscometery.

Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.

Determination of total, temporary & permanent hardness of water by EDTA method.

Determination of DO content of water sample by Winkler,s method.

Determination of chloride content of water sample by argentometric method.

Estimation of copper content of the given solution by Iodometry.

Determination of strength of given hydrochloric acid using pH meter.

Determination of strength of acids in a mixture of acids using conductivity meter.

Estimation of iron content of the given solution using potentiometer.

Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).

Estimation of sodium and potassium present in water using flame photometer.

Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

Pseudo first order kinetics-ester hydrolysis.

Corrosion experiment-weight loss method.

Determination of CMC.

Phase change in a solid.

Conductometric titration of strong acid vs strong base.

TOTAL: 30 PERIODS

OUTCOMES:

The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

TEXTBOOKS:

1. Vogel,s Textbook of Quantitative Chemical Analysis (8^{TH} edition, 2014)

HS8251	**TECHNICAL ENGLISH**	**LTPC 4004**

OBJECTIVES:

The Course prepares second semester engineering and Technology students to:

Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.

Foster their ability to write convincing job applications and effective reports.

Develop their speaking skills to make technical presentations , participate in group discussions.

Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialisation.

UNIT I INTRODUCTION TECHNICAL ENGLISH 12

Listening- Listening to talks mostly of a scientific/technical nature and completing information-gap exercises- **Speaking** –Asking for and giving directions- **Reading** – reading short technical texts from journals- newsapapers- **Writing**- purpose statements – extended definitions – issue- writing instructions – checklists-recommendations-**Vocabulary Development**- technical vocabulary **Language Development** –subject verb agreement - compound words.

UNIT II READING AND STUDY SKILLS 12

Listening- Listening to longer technical talks and completing exercises based on them-**Speaking** – describing a process-**Reading** – reading longer technical texts- identifying the various transitions in a text- paragraphing- **Writing**- interpreting cgarts, graphs- **Vocabulary Development -** vocabulary used in formal letters/emails and reports **Language Development-**impersonal passive voice, numerical adjectives.

UNIT III TECHNICAL WRITING AND GRAMMAR 12

Listening- Listening to classroom lectures/ talkls on engineering/technology -**Speaking** – introduction to technical presentations- **Reading** – longer texts both general and technical, practice in speed reading; **Writing**-Describing a process, use of sequence words- **Vocabulary Development-** sequence words- Misspelled words. **Language Development-** embedded sentences.

UNIT IV REPORT WRITING 12

Listening- Listening to documentaries and making notes. **Speaking** – mechanics of presentations- **Reading** – reading for detailed comprehension- **Writing**- email etiquette- job application – cover letter –Résumé preparation(via email and hard copy)- analytical essays and issue based essays--**Vocabulary Development**- finding suitable synonyms-paraphrasing-. **Language Development-** clauses- if conditionals.

UNIT V GROUP DISCUSSION AND JOB APPLICATIONS 12

Listening- TED/Ink talks; **Speaking** –participating in a group discussion -**Reading**– reading and understanding technical articles **Writing**– Writing reports- minutes of a meeting- accident and survey-**Vocabulary Development- verbal analogies Language Development-** reported speech.

TOTAL :60 PERIODS

OUTCOMES:

At the end of the course learners will be able to:

Read technical texts and write area- specific texts effortlessly.
Listen and comprehend lectures and talks in their area of specialisation successfully.
Speak appropriately and effectively in varied formal and informal contexts.
Write reports and winning job applications.

TEXT BOOKS:

Board of editors. **Fluency in English A Course book for Engineering and Technology.** Orient Blackswan, Hyderabad: 2016

Sudharshana.N.P and Saveetha. C. **English for Technical Communication**. Cambridge University Press: New Delhi, 2016.

REFERENCES:

Booth-L. Diana**, Project Work,** Oxford University Press**,** Oxford: 2014.

Grussendorf, Marion, **English for Presentations,** Oxford University Press, Oxford: 2007

Kumar, Suresh. E. **Engineering English**. Orient Blackswan: Hyderabad,2015

Means, L. Thomas and Elaine Langlois, **English & Communication For Colleges.** Cengage Learning, USA: 2007

Raman, Meenakshi and Sharma, Sangeetha- **Technical Communication Principles and Practice.**Oxford University Press: New Delhi, 2014.

Students can be asked to read Tagore, Chetan Bhagat and for supplementary reading.

MA8251 ENGINEERING MATHEMATICS – II L T P C
4 0 0 4

OBJECTIVES :

This course is designed to cover topics such as Matrix Algebra, Vector Calculus, Complex Analysis and Laplace Transform. Matrix Algebra is one of the powerful tools to handle practical problems arising in the field of engineering. Vector calculus can be widely used for modelling the various laws of physics. The various methods of complex analysis and Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT I MATRICES 12

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II VECTOR CALCULUS 12

Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green,s, Gauss divergence and Stoke,s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTIONS 12

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $w = z + c$, cz, $\frac{1}{z}, z^2$ - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

Line integral - Cauchy,s integral theorem – Cauchy,s integral formula – Taylor,s and Laurent,s series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour.

UNIT V LAPLACE TRANSFORMS 12

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

TOTAL: 60 PERIODS

OUTCOMES :

After successfully completing the course, the student will have a good understanding of the following topics and their applications:

Eigenvalues and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.

Gradient, divergence and curl of a vector point function and related identities.

Evaluation of line, surface and volume integrals using Gauss, Stokes and Green,s theorems and their verification.

Analytic functions, conformal mapping and complex integration.

Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

TEXT BOOKS :

Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.

Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.

REFERENCES :

Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.

Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi , 3rd Edition, 2007.

O,Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.

Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.

Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

PH8201	**PHYSICS FOR CIVIL ENGINEERING** (for B.E. Civil Engineering)	**LTPC** **3 003**

OBJECTIVE:

To introduce the principles of thermal, acoustics, optics and new materials for civil engineering applications.

UNIT I THERMAL PERFORMANCE OF BUILDINGS 9

Heat transfer through fenestrations, thermal insulation and its benefits - heat gain and heat loss estimation - factors affecting the thermal performance of buildings, thermal measurements, thermal comfort, indices of thermal comfort, climate and design of solar radiation, shading devices central heating. Principles of natural ventilation - ventilation measurements, design for natural ventilation - Window types and packaged air conditioners - chilled water plant - fan coil systems - water piping - cooling load - Air conditioning systems for different types of buildings - Protection against fire to be caused by A. C. Systems.

UNIT II ACOUSTICS 9

Classification of sound- decibel- Weber–Fechner law – Sabine,s formula- derivation using growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings and their remedies. Methods of sound absorptions - absorbing materials - noise and its measurements, sound insulation and its measurements, impact of noise in multi-storeyed buildings.

UNIT III LIGHTING DESIGNS 9

Radiation quantities – spectral quantities – relationship between luminescence and radiant quantities – hemispherical reflectance and transmittance – photometry: cosines law, inverse square law. Vision – photobic, mesophic, scotopic visions. Colour – luminous efficiency function - Visual field glare, colour - day light calculations - day light design of windows, measurement of day-light and use of models and artificial skies, principles of artificial lighting, supplementary artificial lighting.

UNIT IV NEW ENGINEERING MATERIALS 9

Composites - definition and classification - Fibre reinforced plastics (FRP) and fiber reinforced metals (FRM) - Metallic glasses - Shape memory alloys - Ceramics - Classification - Crystalline - Non Crystalline - Bonded ceramics, Manufacturing methods - Slip casting - Isostatic pressing - Gas pressure bonding - Properties - thermal, mechanical, electrical and chemical ceramic fibres - ferroelectric and ferromagnetic ceramics - High Aluminium ceramics.

UNIT V HAZARDS 9

Seismology and Seismic waves - Earth quake ground motion - Basic concepts and estimation techniques - site effects - Probabilistic and deterministic Seismic hazard analysis - Cyclone and flood hazards - Fire hazards and fire protection, fire-proofing of materials, fire safety regulations and firefighting equipment - Prevention and safety measures.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course,

the students will have knowledge on the thermal performance of buildings,
the students will acquire knowledge on the acoustic properties of buildings,
the students will get knowledge on various lighting designs for buildings,
the students will gain knowledge on the properties and performance of engineering materials, and
the students will understand the hazards of buildings.

TEXT BOOKS:

Alexander, D. “Natural disaster”, Springer (1993).

Budinski, K.G. & Budinski, M.K. “Engineering Materials Properties and Selection”, Prentice Hall, 2009.

Severns, W.H. & Fellows, J.R. “Air conditioning and Refrigeration”, John Wiley and Sons, London, 1988.

Stevens, W.R., “Building Physics: Lighting: Seeing in the Artificial Environment, Pergaman Press, 2013.

REFERENCES:

Gaur R.K. and Gupta S.L., Engineering Physics. Dhanpat Rai publishers, 2012.

Reiter, L. “Earthquake hazard analysis - Issues and insights”, Columbia University Press, 1991.

Shearer, P.M. “Introduction to Seismology”, Cambridge University Press, 1999.

BE8251 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LTPC 3003

OBJECTIVES:

To explain the basic theorems used in Electrical circuits and the different components and function of electrical machines.
To explain the fundamentals of semiconductor and applications.
To explain the principles of digital electronics
To impart knowledge of communication.

UNIT I ELECTRICAL CIRCUITS & MEASURMENTS 9

Fundamental laws of electric circuits– Steady State Solution of DC Circuits – Introduction to AC Circuits –Sinusoidal steady state analysis– Power and Power factor – Single Phase and Three Phase Balanced Circuits. Classification of instruments – Operating Principles of indicating Instruments

UNIT II ELECTRICAL MACHINES 9

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS 9

Introduction - Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation.

Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier.

UNIT IV DIGITAL ELECTRONICS 9

Binary Number System – Boolean Algebra theorems– Digital circuits - Introduction to sequential Circuits– Flip-Flops – Registers and Counters – A/D and D/A Conversion – digital processing architecture.

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING 9

Introduction – Elements of Communication Systems– Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Digital Communication - Communication Systems: Radio, Antenna, TV, Fax, ISDN, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

TOTAL: 45 PERIODS

OUTCOMES:

ability to identify the electrical components and explain the characteristics of electrical machines.

ability to identify electronics components and understand the characteristics

TEXT BOOKS:

D P Kothari and I.J Nagarath, ”Electrical Machines “Basic Electrical and Electronics Engineering”, McGraw Hill Education(India) Private Limited, Third Reprint ,2016

S.K.Bhattacharya “Basic Electrical and Electronics Engineering”, Pearson India, 2011

Sedha R.S., “Applied Electronics”, S. Chand & Co., 2006

REFERENCES:

A.E. Fitzgerald, David E Higginbotham and Arvin Grabel, “Basic Electrical Engineering”, McGraw Hill Education(India) Private Limited, 2009

Del Toro, “Electrical Engineering Fundamentals”, Pearson Education, New Delhi, 2007

Leonard S Bobrow, “ Foundations of Electrical Engineering”, Oxford University Press, 2013

Mahmood Nahvi and Joseph A. Edminister, “Electric Circuits”, Schaum, Outline Series, McGraw Hill, 2002.

Mehta V K, “Principles of Electronics”, S.Chand & Company Ltd, 1994.

Nagsarkar T K and Sukhija M S, “Basics of Electrical Engineering”, Oxford press 2005.

GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C

3 0 0 3

OBJECTIVES:

To study the nature and facts about environment.

To finding and implementing scientific, technological, economic and political solutions to environmental problems.

To study the interrelationship between living organism and environment.

To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.

To study the dynamic processes and understand the features of the earth"s interior and surface.

To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

Public awareness of environmental is at infant stage.

Ignorance and incomplete knowledge has lead to misconceptions

Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS:

Benny Joseph, ˆEnvironmental Science and Engineering,, Tata McGraw-Hill, New Delhi, 2006.

Gilbert M.Masters, ˆIntroduction to Environmental Engineering and Science,, 2nd edition, Pearson Education, 2004.

REFERENCES :

Dharmendra S. Sengar, ˆEnvironmental law,, Prentice hall of India Pvt Ltd, New Delhi, 2007.

Erach Bharucha, “Textbook of Environmental Studies”, Universities Press(I) Pvt, Ltd, Hydrabad, 2015.

G. Tyler Miller and Scott E. Spoolman, “Environmental Science”, Cengage Learning India PVT, LTD, Delhi, 2014.

Rajagopalan, R, ˆEnvironmental Studies-From Crisis to Cure,, Oxford University Press, 2005.

GE8292 ENGINEERING MECHANICS LTPC

3 2 0 4

OBJECTIVES:

To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

UNIT I STATICS OF PARTICLES 9+6

Introduction – Units and Dimensions – Laws of Mechanics – Lami,s theorem, Parallelogram and triangular Law of forces – Vectorial representation of forces – Vector operations of forces - additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility .

UNIT II EQUILIBRIUM OF RIGID BODIES 9+6

Free body diagram – Types of supports –Action and reaction forces –stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon,s theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions

UNIT III PROPERTIES OF SURFACES AND SOLIDS 9+6

Centroids and centre of mass – Centroids of lines and areas - Rectangular, circular, triangular areas by integration – T section, I section, - Angle section, Hollow section by using standard formula –Theorems of Pappus - Area moments of inertia of plane areas – Rectangular, circular, triangular areas by integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Principal moments of inertia of plane areas – Principal axes of inertia-Mass moment of inertia –mass moment of inertia for prismatic, cylindrical and spherical solids from first principle – Relation to area moments of inertia.

UNIT IV DYNAMICS OF PARTICLES 9+6

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion Newton,s laws of motion – Work Energy Equation– Impulse and Momentum – Impact of elastic bodies.

UNIT V FRICTION AND RIGID BODY DYNAMICS 9+6

Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction –wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

TOTAL : (45+30)=75 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

illustrate the vectorial and scalar representation of forces and moments
analyse the rigid body in equilibrium
evaluate the properties of surfaces and solids
calculate dynamic forces exerted in rigid body
determine the friction and the effects by the laws of friction

TEXT BOOKS:

Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
Vela Murali, "Engineering Mechanics", Oxford University Press (2010)

REFERENCES:

Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers, 1998.
Hibbeller, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education 2010.
Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4th Edition, Pearson Education 2006.
Meriam J.L. and Kraige L.G., " Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2", Third Edition, John Wiley & Sons,1993.
Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.

GE8261 ENGINEERING PRACTICES LABORATORY LTPC
004 2

OBJECTIVES:

To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE 13

Buildings:

Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
Study of pipe connections requirements for pumps and turbines.

Preparation of plumbing line sketches for water supply and sewage works.
Hands-on-exercise:
Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

Study of the joints in roofs, doors, windows and furniture.
Hands-on-exercise:
Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE 18

Welding:

(a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
(b) Gas welding practice

Basic Machining:

Simple Turning and Taper turning
Drilling Practice

Sheet Metal Work:

Forming & Bending:
Model making – Trays and funnels.
Different type of joints.

Machine assembly practice:

Study of centrifugal pump
Study of air conditioner

Demonstration on:

Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
Foundry operations like mould preparation for gear and step cone pulley.
Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 13

Residential house wiring using switches, fuse, indicator, lamp and energy meter.
Fluorescent lamp wiring.
Stair case wiring
Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
Measurement of energy using single phase energy meter.
Measurement of resistance to earth of an electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE 16

Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
Study of logic gates AND, OR, EX-OR and NOT.
Generation of Clock Signal.
Soldering practice – Components Devices and Circuits – Using general purpose PCB.

Measurement of ripple factor of HWR and FWR.

TOTAL: 60 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to
fabricate carpentry components and pipe connections including plumbing works.
use welding equipments to join the structures.
Carry out the basic machining operations
Make the models using sheet metal works

Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings

Carry out basic home electrical works and appliances

Measure the electrical quantities

Elaborate on the components, gates, soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	15 Sets.
2. Carpentry vice (fitted to work bench)	15 Nos.
3. Standard woodworking tools	15 Sets.
4. Models of industrial trusses, door joints, furniture joints	5 each
5. Power Tools:	
(a) Rotary Hammer	2 Nos
(b) Demolition Hammer	2 Nos
(c) Circular Saw	2 Nos
(d) Planer	2 Nos
(e) Hand Drilling Machine	2 Nos
(f) Jigsaw	2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders	5 Nos.
2. Welding booth with exhaust facility	5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos.
5. Centre lathe	2 Nos.
6. Hearth furnace, anvil and smithy tools	2 Sets.
7. Moulding table, foundry tools	2 Sets.
8. Power Tool: Angle Grinder	2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner	One each.

ELECTRICAL

1. Assorted electrical components for house wiring	15 Sets
2. Electrical measuring instruments	10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp	1 each
4. Megger (250V/500V)	1 No.
5. Power Tools: (a) Range Finder	2 Nos
(b) Digital Live-wire detector	2 Nos

ELECTRONICS

1. Soldering guns	10 Nos.
2. Assorted electronic components for making circuits	50 Nos.
3. Small PCBs	10 Nos.
4. Multimeters	10 Nos.
Study purpose items: Telephone, FM radio, low-voltage power supply	

CE8211 COMPUTER AIDED BUILDING DRAWING LT PC 0042

OBJECTIVES:

To introduce the students to draft the plan, elevation and sectional views of buildings in accordance with development and control rules satisfying orientation and functional requirements as per National Building Code.

LIST OF EXPERIMENTS

Principles of planning, orientation and complete joinery details (Paneled and Glazed Doors and Windows)
Buildings with load bearing walls
Buildings with sloping roof
R.C.C. framed structures.
Industrial buildings – North light roof structures

TOTAL: 60 PERIODS

OUTCOMES:

The students will be able to draft the plan, elevation and sectional views of the buildings, industrial structures, and framed buildings using computer softwares.

TEXTBOOKS:

Sikka V.B., A Course in Civil Engineering Drawing, 4th Edition, S.K.Kataria and Sons, 2015.
George Omura, Mastering in Autocad 2005 and Autocad LT 2005– BPB Publications, 2008

REFERENCES:

Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston, BIM Handbook:A Guide to building information modeling for Owners, Managers, Designers, Engineers, and Contractors, John Wiley and Sons. Inc.,2011.
Marimuthu V.M., Murugesan R. and Padmini S., Civil Engineering Drawing-I, Pratheeba Publishers, 2008.
Shah.M.G., Kale. C.M. and Patki.S.Y., Building Drawing with an Integrated Approach to Built Environment, Tata McGraw Hill Publishers Limited, 2007.
Verma.B.P., Civil Engineering Drawing and House Planning, Khanna Publishers, 2010.

MA8353 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C 4 0 0 4

OBJECTIVES :

To introduce the basic concepts of PDE for solving standard partial differential equations.
To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
To acquaint the student with Fourier transform techniques used in wide variety of situations.
To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations – Singular integrals - Solutions of standard types of first order partial differential equations - Lagrange,s linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT II FOURIER SERIES 12

Dirichlet,s conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier series – Parseval,s identity – Harmonic analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 12

Classification of PDE – Method of separation of variables - Fourier Series Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT IV FOURIER TRANSFORMS 12

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval,s identity.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 12

Z-transforms - Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL: 60 PERIODS

OUTCOMES :

Upon successful completion of the course, students should be able to:

Understand how to solve the given standard partial differential equations.

Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.

Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.

Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

TEXT BOOKS:

Grewal B.S., “Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.

Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.

REFERENCES :

Andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SPIE Press, 1999.

Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Edition, Laxmi Publications Pvt. Ltd, 2014.

Erwin Kreyszig, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, India, 2016.

James, G., "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
Wylie, R.C. and Barrett, L.C., “Advanced Engineering Mathematics “Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

CE8301 STRENGTH OF MATERIALS I LTPC 3003

OBJECTIVES:

To learn the fundamental concepts of Stress, Strain and deformation of solids.
To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
To understand the effect of torsion on shafts and springs.
To analyze plane and space trusses

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 9

Simple Stresses and strains – Elastic constants - Relationship between elastic constants – Stress Strain Diagram – Ultimate Stress – Yield Stress – Deformation of axially loaded member - Composite Bars - Thermal Stresses – State of Stress in two dimensions – Stresses on inclined planes – Principal Stresses and Principal Planes – Maximum shear stress - Mohr’s circle method.

UNIT II TRANSFER OF LOADS AND STRESSES IN BEAMS 9

Types of loads, supports, beams – concept of shearing force and bending moment - Relationship between intensity of load, Shear Force and Bending moment - Shear Force and Bending Moment Diagrams for Cantilever, simply supported and overhanging beams with concentrated load, uniformly distributed load, uniformly varying load and concentrated moment. Theory of Simple Bending – Stress Distribution due to bending moment and shearing force - Flitched Beams - Leaf Springs.

UNIT III DEFLECTION OF BEAMS 9

Elastic curve – Governing differential equation - Double integration method - Macaulay’s method - Area moment method - conjugate beam method for computation of slope and deflection of determinant beams.

UNIT IV TORSION 9

Theory of Torsion – Stresses and Deformations in Solid and Hollow Circular Shafts – combined bending moment and torsion of shafts - Power transmitted to shaft – Shaft in series and parallel – Closed and Open Coiled helical springs – springs in series and parallel – Design of buffer springs.

UNIT V ANALYSIS OF TRUSSES 9

Determinate and indeterminate trusses - Analysis of pin jointed plane determinate trusses by method of joints, method of sections and tension coefficient – Analysis of Space trusses by tension coefficient method.

TOTAL :45 PERIODS

OUTCOMES:

Students will be able to

Understand the concepts of stress and strain, principal stresses and principal planes.
Determine Shear force and bending moment in beams and understand concept of theory of simple bending.
Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.
Apply basic equation of torsion in design of circular shafts and helical springs, .
Analyze the pin jointed plane and space trusses

TEXTBOOKS:

Rajput.R.K. “Strength of Materials”, S.Chand and Co, New Delhi, 2015.

Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain, SMTS –I Strength of materials, Laxmi publications. New Delhi, 2015

Rattan . S. S, “Strength of Materials”, Tata McGraw Hill Education Private Limited, New Delhi, 2012

Bansal. R.K. “Strength of Materials”, Laxmi Publications Pvt. Ltd., New Delhi, 2010

REFERENCES :

Timoshenko.S.B. and Gere.J.M, “Mechanics of Materials”, Van Nos Reinbhold, New Delhi 1999.

Vazirani.V.N and Ratwani.M.M, “Analysis of Structures”, Vol I Khanna Publishers, New Delhi,1995.

Junnarkar.S.B. and Shah.H.J, “Mechanics of Structures”, Vol I, Charotar Publishing House, New Delhi 2016.

Singh. D.K., “ Strength of Materials”, Ane Books Pvt. Ltd., New Delhi, 2016

Basavarajaiah, B.S. and Mahadevappa, P., Strength of Materials, Universities Press, Hyderabad, 2010.

Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009.

CE8302 FLUID MECHANICS LTPC
3003

OBJECTIVE:

To understand the basic properties of the fluid, fluid kinematics, fluid dynamics and to analyze and appreciate the complexities involved in solving the fluid flow problems.

UNIT I FLUID PROPERTIES AND FLUID STATICS 9

Fluid – definition, distinction between solid and fluid - Units and dimensions - Properties of fluids - density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapour pressure, capillarity and surface tension - Fluid statics: concept of fluid static pressure, absolute and gauge pressures - pressure measurements by manometers-forces on planes – centre of pressure – buoyancy and floatation.

UNIT II FLUID KINEMATICS AND DYNAMICS 9

Fluid Kinematics – Classification and types of flow - velocity field and acceleration - continuity equation (one and three dimensional differential forms)- stream line-streak line-path line- stream function - velocity potential function - flow net. Fluid dynamics - equations of motion -Euler’s equation along a streamline - Bernoulli’s equation – applications - venturi meter, orifice meter and Pitot tube- linear momentum equation and its application to pipe bend.

UNIT III DIMENSIONAL ANALYSIS AND MODEL STUDIES 9

Fundamental dimensions - dimensional homogeneity - Rayleigh,s method and Buckingham Pi-theorem - dimensionless parameters - similitudes and model studies - distorted models.

UNIT IV FLOW THROUGH PIPES 9

Reynold,s experiment - laminar flow through circular pipe (Hagen poiseulle’s) - hydraulic and energy gradient – flow through pipes - Darcy - Weisbach’s equation - pipe roughness -friction factor-Moody’s diagram- major and minor losses of flow in pipes - pipes in series and in parallel.

UNIT V BOUNDARY LAYER 9

Boundary layer – definition- boundary layer on a flat plate – laminar and turbulent boundary layer-displacement, energy and momentum thickness – Momentum integral equation-Boundary layer separation and control – drag on flat plate.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course students will be able to

Get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
Understand and solve the problems related to equation of motion.
Gain knowledge about dimensional and model analysis.
Learn types of flow and losses of flow in pipes.
Understand and solve the boundary layer problems.

TEXT BOOKS*:*

Modi P.N and Seth "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi, 2009.
Jain.A.K.., "Fluid Mechanics" (Including Hydraulic Machines), Khanna Publishers, Twelfth Edition, 2016.
Subramanya.K " Fluid Mechanics and Hydraulic Machines", Tata McGraw Hill Education Private Limited, New Delhi, 2010.
Rajput.R.K. “Fluid Mechanics", S.Chand and Co, New Delhi, 2008.

REFERENCES:

Streeter, V.L., and Wylie, E.B., “Fluid Mechanics”, McGraw Hill, 2000.
Fox W.R. and McDonald A.T., Introduction to Fluid Mechanics John-Wiley and Sons, Singapore, 2013.
White, F.M., “Fluid Mechanics”, Tata McGraw Hill, 5th Edition, New Delhi, 2017.
Mohd. Kaleem Khan, "Fluid Mechanics and Machinery", Oxford University Press, New Delhi, 2015.
Bansal.R.K., “Fluid Mechanics and Hydraulic Machines”, Laxmi Publications Pvt. Ltd., New Delhi, 2013.

CE8351 SURVEYING LTPC
3 003

OBJECTIVES :

To introduce the rudiments of plane surveying and geodetic principles to Civil Engineers.
To learn the various methods of plane and geodetic surveying to solve the real world Civil Engineering problems.
To introduce the concepts of Control Surveying
To introduce the basics of Astronomical Surveying

UNIT I FUNDAMENTALS OF CONVENTIONAL SURVEYING AND LEVELLING 9

Classifications and basic principles of surveying - Equipment and accessories for ranging and chaining - Methods of ranging - Compass - Types of Compass - Basic Principles- Bearing – Types - True Bearing - Magnetic Bearing - Levelling- Principles and theory of Levelling – Datum- - Bench Marks – Temporary and Permanent Adjustments- Methods of Levelling- Booking – Reduction - Sources of errors in Levelling - Curvature and refraction.

UNIT II THEODOLITE AND TACHEOMETRIC SURVEYING 9

Horizontal and vertical angle measurements - Temporary and permanent adjustments - Heights and distances - Tacheometer - Stadia Constants - Analytic Lens -Tangential and Stadia Tacheometry surveying - Contour – Contouring – Characteristics of contours – Methods of contouring – Tacheometric contouring - Contour gradient – Uses of contour plan and map

UNIT III CONTROL SURVEYING AND ADJUSTMENT 9

Horizontal and vertical control – Methods – specifications – triangulation- baseline – satellite stations – reduction to centre- trigonometrical levelling – single and reciprocal observations – traversing – Gale,s table. - Errors Sources- precautions and corrections – classification of errors –

true and most probable values - weighed observations – method of equal shifts – principle of least squares - normal equation – correlates- level nets- adjustment of simple triangulation networks.

UNIT IV ADVANCED TOPICS IN SURVEYING 9

Hydrographic Surveying – Tides – MSL – Sounding methods – Three point problem – Strength of fix – astronomical Surveying – Field observations and determination of Azimuth by altitude and hour angle methods –.Astronomical terms and definitions - Motion of sun and stars - Celestial coordinate systems - different time systems - Nautical Almanac - Apparent altitude and corrections - Field observations and determination of time, longitude, latitude and azimuth by altitude and hour angle method

UNIT V MODERN SURVEYING 9

Total Station : Advantages - Fundamental quantities measured - Parts and accessories - working principle - On board calculations - Field procedure - Errors and Good practices in using Total Station GPS Surveying : Different segments - space, control and user segments - satellite configuration - signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - Hand Held and Geodetic receivers - data processing - Traversing and triangulation.

TOTAL : 45 PERIODS

OUTCOMES :

At the end of the course the student will be able to understand

- The use of various surveying instruments and mapping
- Measuring Horizontal angle and vertical angle using different instruments
- Methods of Leveling and setting Levels with different instruments
- Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth
- Concept and principle of modern surveying.

TEXTBOOKS :

- Kanetkar.T.P and Kulkarni.S.V, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 2008
- Punmia.B.C., Ashok K.Jain and Arun K Jain , Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, 2005
- James M. Anderson and Edward M. Mikhail, "Surveying, Theory and Practice", 7th Edition, McGraw Hill, 2001.
- Bannister and S. Raymond, "Surveying", 7th Edition, Longman 2004.
- Laurila, S.H. "Electronic Surveying in Practice", John Wiley and Sons Inc, 1993
- Venkatramaiah, Text book of Surveying, University press, New Delhi, 2014

REFERENCES :

- Alfred Leick, “GPS satellite surveying”, John Wiley & Sons Inc., 3rd Edition, 2004.
- Guocheng Xu, “GPS Theory , Algorithms and Applications”, Springer – Berlin, 2003.
- SatheeshGopi, rasathishkumar, N. madhu, “Advanced Surveying, Total Station GPS and Remote Sensing” Pearson education, 2007
- Roy S.K., "Fundamentals of Surveying", 2nd Edition, Prentice Hall of India, 2004.
- Arora K.R.,"Surveying Vol I & II", Standard Book house, 10th Edition 2008

CE8391 CONSTRUCTION MATERIALS L T P C 3 0 0 3

OBJECTIVE:

To introduce students to various materials commonly used in civil engineering construction and their properties.

UNIT I STONES – BRICKS – CONCRETE BLOCKS 9

Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Compressive Strength – Water Absorption – Efflorescence – Bricks for special use – Refractory bricks – Concrete blocks – Lightweight concrete blocks.

UNIT II LIME – CEMENT – AGGREGATES – MORTAR 9

Lime – Preparation of lime mortar – Cement – Ingredients – Manufacturing process – Types and Grades – Properties of cement and Cement mortar – Hydration – Compressive strength – Tensile strength – Fineness– Soundness and consistency – Setting time – fine aggregates – river sand – crushed stone sand – properties – coarse Aggregates – Crushing strength – Impact strength – Flakiness Index – Elongation Index – Abrasion Resistance – Grading

UNIT III CONCRETE 9

Concrete – Ingredients – Manufacturing Process – Batching plants –mixing – transporting – placing – compaction of concrete –curing and finishing – Ready mix Concrete – Mix specification.

UNIT IV TIMBER AND OTHER MATERIALS 9

Timber – Market forms – Industrial timber– Plywood – Veneer – Thermocol – Panels of laminates – Steel – Aluminum and Other Metallic Materials – Composition – Aluminium composite panel – Market forms – Mechanical treatment – Paints – Varnishes – Distempers – Bitumens.

UNIT V MODERN MATERIALS 9

Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles– Geomembranes and Geotextiles for earth reinforcement.

TOTAL: 45 PERIODS

OUTCOMES:

On completion of this course the students will be able to

Compare the properties of most common and advanced building materials.
understand the typical and potential applications of lime, cement and aggregates
know the production of concrete and also the method of placing and making of concrete elements.
understand the applications of timbers and other materials
Understand the importance of modern material for construction.

TEXT BOOKS:

Varghese.P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2015.
Rajput. R.K., "Engineering Materials", S. Chand and Company Ltd., 2008.
Gambhir.M.L., "Concrete Technology", 3rd Edition, Tata McGraw Hill Education, 2004
Duggal.S.K., "Building Materials", 4th Edition, New Age International, 2008.

REFERENCES:

Jagadish.K.S, "Alternative Building Materials Technology", New Age International, 2007.
Gambhir. M.L., & Neha Jamwal., "Building Materials, products, properties and systems", Tata McGraw Hill Educations Pvt. Ltd, New Delhi, 2012.
IS456 - 2000: Indian Standard specification for plain and reinforced concrete, 2011
IS4926 - 2003: Indian Standard specification for ready–mixed concrete, 2012
IS383 - 1970: Indian Standard specification for coarse and fine aggregate from natural Sources for concrete, 2011
IS1542-1992: Indian standard specification for sand for plaster, 2009
IS 10262-2009: Indian Standard Concrete Mix Proportioning –Guidelines, 2009

CE8392 ENGINEERING GEOLOGY LT PC 3003

OBJECTIVE:

At the end of this course the students will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and to apply this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor.

UNIT I PHYSICAL GEOLOGY 9

Geology in civil engineering – branches of geology – structure of earth and its composition weathering of rocks – scale of weathering – soils - landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India.

UNIT II MINEROLOGY Physical properties of minerals – augite, Amphibole – hornblende, minerals. Quartz group, Feldspar group, Pyroxene - hypersthene and Mica – muscovite and biotite, Calcite, Gypsum and Clay **9**

UNIT III PETROLOGY 9

Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS 9

Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Seismic and electrical methods for subsurface investigations.

UNIT V APPLICATION OF GEOLOGICAL INVESTIGATIONS 9

Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings - Hydrogeological investigations and mining - Coastal protection structures. Investigation of Landslides, causes and mitigation.

TOTAL: 45 PERIODS

OUTCOMES:

The students completing this course

Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.

Will get basics knowledge on properties of minerals.

Gain knowledge about types of rocks, their distribution and uses.

Will understand the methods of study on geological structure.

Will understand the application of geological investigation in projects such as dams, tunnels, bridges, roads, airport and harbor

TEXT BOOKS:

Varghese, P.C., Engineering Geology for Civil Engineering Prentice Hall of India Learning Private Limited, New Delhi, 2012.

Venkat Reddy. D. Engineering Geology, Vikas Publishing House Pvt. Lt, 2010.

Gokhale KVGK, "Principles of Engineering Geology", B.S. Publications, Hyderabad 2011.

Chenna Kesavulu N. "Textbook of Engineering Geology", Macmillan India Ltd., 2009.

Parbin Singh. A "Text book of Engineering and General Geology", Katson publishing house, Ludhiana 2009.

REFERENCES:

Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010.

Bell .F.G.. "Fundamentals of Engineering Geology", B.S. Publications. Hyderabad 2011.

Dobrin, M.B "An introduction to geophysical prospecting", McGraw Hill, New Delhi, 1988.

CE8311 CONSTRUCTION MATERIALS LABORATORY L T P C
0 0 4 2

OBJECTIVE:

To facilitate the understanding of the behavior of construction materials.

I. TEST ON FINE AGGREGATES 15

Grading of fine aggregates
Test for specific gravity and test for bulk density
Compacted and loose bulk density of fine aggregate

II. TEST ON COARSE AGGREGATE 15

Determination of impact value of coarse aggregate
Determination of elongation index
Determination of flakiness index
Determination of aggregate crushing value of coarse aggregate

III. TEST ON CONCRETE 15

Test for Slump
Test for Compaction factor
Test for Compressive strength - Cube & Cylinder
Test for Flexural strength

IV. TEST ON BRICKS AND BLOCKS 15

Test for compressive strength of bricks and blocks
Test for Water absorption of bricks and blocks
Determination of Efflorescence of bricks
Test on tiles

TOTAL: 60 PERIODS

OUTCOME:

The students will have the required knowledge in the area of testing of construction materials and components of construction elements experimentally.

REFERENCES:

Construction Materials Laboratory Manual, Anna University, Chennai-600 025.
IS 4031 (Part 1) – 1996 – Indian Standard Method for determination of fineness by drysieving.
IS 2386 (Part 1 to Part 6) – 1963 – Indian Standard methods for test for aggregate for concrete
IS 383 – 1970 Indian Standard specification for coarse and fine aggregates from natural sources for concrete.

CE8361 SURVEYING LABORATORY L T P C
0 0 4 2

OBJECTIVE :

At the end of the course the student will posses knowledge about Survey field techniques

LIST OF EXPERIMENTS:

Chain Survey

Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset

Setting out works – Foundation marking using tapes single Room and Double Room

Compass Survey

3. Compass Traversing – Measuring Bearings & arriving included angles

Levelling - Study of levels and levelling staff

Fly levelling using Dumpy level &Tilting level

Check levelling

Theodolite - Study of Theodolite

Measurements of horizontal angles by reiteration and repetition and vertical angles

Determination of elevation of an object using single plane method when base is accessible/inaccessible.

Tacheometry – Tangential system – Stadia system

Determination of Tacheometric Constants

Heights and distances by stadia Tacheometry

Heights and distances by Tangential Tacheometry

Total Station - Study of Total Station, Measuring Horizontal and vertical angles

Traverse using Total station and Area of Traverse

Determination of distance and difference in elevation between two inaccessible points using Total station

TOTAL: 60 PERIODS

OUTCOME:

Students completing this course would have acquired practical knowledge on handling basic survey instruments including Theodolite, Tacheometry, Total Station and GPS and have adequate knowledge to carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and Location of site etc.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

Sl.No.	Description of Equipment	Quantity
1.	Total Station	3 Nos
2.	Theodolites	Atleast 1 for every 5 students
3.	Dumpy level / Filling level	Atleast 1 for every 5 students
4.	Pocket stereoscope	1
5.	Ranging rods	1 for a set of 5 students
6.	Levelling staff	
7.	Cross staff	
8.	Chains	
9.	Tapes	
10.	Arrows	
11.	Prismatic Compass	10 nos
12.	Surveyor Compass	2 nos
13.	Survey grade or Hand held GPS	3 nos

HS8381	INTERPERSONAL SKILLS/LISTENING AND SPEAKING	L	T	P	C
		0	0	2	1

OBJECTIVES:

The Course will enable learners to:

Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.

Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.

improve general and academic listening skills

Make effective presentations.

UNIT I

Listening as a key skill- its importance- speaking - give personal information - ask for personal information - express ability - enquire about ability - ask for clarification Improving pronunciation - pronunciation basics taking lecture notes - preparing to listen to a lecture - articulate a complete idea as opposed to producing fragmented utterances.

UNIT II

Listen to a process information- give information, as part of a simple explanation - conversation starters: small talk - stressing syllables and speaking clearly - intonation patterns - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

UNIT III

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk - greet - respond to greetings - describe health and symptoms - invite and offer - accept - decline - take leave - listen for and follow the gist- listen for detail

UNIT IV

Being an active listener: giving verbal and non-verbal feedback - participating in a group discussion - summarizing academic readings and lectures conversational speech listening to and participating in conversations - persuade.

UNIT V

Formal and informal talk - listen to follow and respond to explanations, directions and instructions in academic and business contexts - strategies for presentations and interactive communication - group/pair presentations - negotiate disagreement in group work.

TOTAL : 30 PERIODS

OUTCOMES:

At the end of the course Learners will be able to:

Listen and respond appropriately.

Participate in group discussions

Make effective presentations

Participate confidently and appropriately in conversations both formal and informal

TEXTBOOKS:

Brooks,Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011.

Richards,C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010

REFERENCES:

Bhatnagar, Nitin and MamtaBhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.

Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.

Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.
Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.
Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford, 2014

MA8491 NUMERICAL METHODS L T P C
4 0 0 4

OBJECTIVES :

To introduce the basic concepts of solving algebraic and transcendental equations.

To introduce the numerical techniques of interpolation in various intervals in real life situations.

To acquaint the student with understanding of numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.

To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

To understand the knowledge of various techniques and methods of solving various types of partial differential equations.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi,s method for symmetric matrices.

UNIT II INTERPOLATION AND APPROXIMATION 12

Interpolation with unequal intervals - Lagrange's interpolation – Newton,s divided difference interpolation – Cubic Splines - Difference operators and relations - Interpolation with equal intervals - Newton,s forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 12

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson,s 1/3 rule – Romberg,s Method - Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson,s 1/3 rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single step methods - Taylor,s series method - Euler,s method - Modified Euler,s method - Fourth order Runge - Kutta method for solving first order equations - Multi step methods - Milne,s and Adams - Bash forth predictor corrector methods for solving first order equations.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 12 Finite difference methods for solving second order two - point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace,s and Poisson,s equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method.

TOTAL : 60 PERIODS

OUTCOMES :

Upon successful completion of the course, students should be able to:

Understand the basic concepts and techniques of solving algebraic and transcendental equations.

Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations.

Apply the numerical techniques of differentiation and integration for engineering problems.

Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXTBOOKS :

Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.

Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

REFERENCES :

Brian Bradie, "A Friendly Introduction to Numerical Analysis", Pearson Education, Asia, New Delhi, 2007.

Gerald. C. F. and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 6th Edition, New Delhi, 2006.

Mathews, J.H. "Numerical Methods for Mathematics, Science and Engineering", 2nd Edition, Prentice Hall, 1992.

Sankara Rao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt. Ltd, 3rd Edition, New Delhi, 2007.

Sastry, S.S, "Introductory Methods of Numerical Analysis", PHI Learning Pvt. Ltd, 5th Edition, 2015.

CE8401 CONSTRUCTION TECHNIQUES AND PRACTICES LTPC
3 0 0 3

OBJECTIVE:

The main objective of this course is to make the student aware of the various construction techniques, practices and the equipment needed for different types of construction activities. At the end of this course the student shall have a reasonable knowledge about the various construction procedures for sub to super structure and also the equipment needed for construction of various types of structures from foundation to super structure.

UNIT I CONSTRUCTION TECHNIQUES 9

Structural systems - Load Bearing Structure - Framed Structure - Load transfer mechanism – floor system - Development of construction techniques - High rise Building Technology - Seismic effect - Environmental impact of materials – responsible sourcing - Eco Building (Green Building) - Material used - Construction methods - Natural Buildings - Passive buildings - Intelligent(Smart) buildings - Meaning - Building automation - Energy efficient buildings for various zones-Case studies of residential, office buildings and other buildings in each zones.

UNIT II CONSTRUCTION PRACTICES 9

Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed – centering and shuttering – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – braced domes – laying brick –– weather and water proof – roof finishes – acoustic and fire protection.

UNIT III SUB STRUCTURE CONSTRUCTION 9

Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam - cable anchoring and grouting - driving diaphragm walls, sheet piles - shoring for deep cutting - well points -Dewatering and stand by Plant equipment for underground open excavation.

UNIT IV SUPER STRUCTURE CONSTRUCTION 9

Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors - Erection of articulated structures, braced domes and space decks.

UNIT V CONSTRUCTION EQUIPMENT 9

Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching, mixing and concreting - Equipment for material handling and erection of structures – types of cranes - Equipment for dredging, trenching, tunneling,

TOTAL: 45 PERIODS

OUTCOMES:

On successful completion of this course, students will be able to:

know the different construction techniques and structural systems

Understand various techniques and practices on masonry construction, flooring, and roofing.

Plan the requirements for substructure construction.

Know the methods and techniques involved in the construction of various types of super structures

Select, maintain and operate hand and power tools and equipment used in the building construction sites.

TEXTBOOKS :

Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning, Equipment and Methods", 5th Edition, McGraw Hill, Singapore, 1995.

Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, 1997.

Varghese, P.C. "Building construction", Prentice Hall of India Pvt. Ltd, New Delhi, 2007.

REFERENCES:

Jha J and Sinha S.K., "Construction and Foundation Engineering", Khanna Publishers, 1999.

Sharma S.C. “Construction Equipment and Management”, Khanna Publishers New Delhi, 2002.

Deodhar, S.V. “Construction Equipment and Job Planning”, Khanna Publishers, New Delhi, 2012.

Mahesh Varma, “Construction Equipment and its Planning and Application”, Metropolitan Book Company, New Delhi, 1983.

CE8402 STRENGTH OF MATERIALS II LTPC 3003

OBJECTIVES:

To know the method of finding slope and deflection of beams and trusses using energy theorems and to know the concept of analysing indeterminate beam

To estimate the load carrying capacity of columns, stresses due to unsymmetrical bending and various theories for failure of material.

UNIT I ENERGY PRINCIPLES 9

Strain energy and strain energy density – strain energy due to axial load (gradual, sudden and impact loadings) , shear, flexure and torsion – Castigliano,s theorems – Maxwell,s reciprocal theorem - Principle of virtual work – unit load method - Application of energy theorems for computing deflections in determinate beams , plane frames and plane trusses – lack of fit and temperature effects - Williot Mohr's Diagram.

UNIT II INDETERMINATE BEAMS 9

Concept of Analysis - Propped cantilever and fixed beams - fixed end moments and reactions – sinking and rotation of supports - Theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams.

UNIT III COLUMNS AND CYLINDERS 9

Euler,s column theory – critical load for prismatic columns with different end conditions – Effective length – limitations - Rankine-Gordon formula - Eccentrically loaded columns – middle third rule - core of a section – Thin cylindrical and spherical shells – stresses and change in dimensions - Thick cylinders – Compound cylinders – shrinking on stresses.

UNIT IV STATE OF STRESS IN THREE DIMENSIONS 9

Stress tensor at a point – Stress invariants - Determination of principal stresses and principal planes - Volumetric strain. Theories of failure: Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Total Strain energy theory – Maximum distortion energy theory – Application problems.

UNIT V ADVANCED TOPICS 9

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections – Shear Centre - curved beams – Winkler Bach formula **–** stresses in hooks.

TOTAL: 45 PERIODS

OUTCOMES:

Students will be able to

Determine the strain energy and compute the deflection of determinate beams, frames and trusses using energy principles.

Analyze propped cantilever, fixed beams and continuous beams using theorem of three moment equation for external loadings and support settlements.

find the load carrying capacity of columns and stresses induced in columns and cylinders

Determine principal stresses and planes for an element in three dimensional state of stress and study various theories of failure

Determine the stresses due to Unsymmetrical bending of beams, locate the shear center, and find the stresses in curved beams.

TEXTBOOKS:

Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand & company Ltd., New Delhi, 2015.

Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011.

Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain,"Theory of Structures" (SMTS) Vol - II, Laxmi Publishing Pvt Ltd, New Delhi 2017.
Basavarajiah and Mahadevapa, Strength of Materials, University press, Hyderabad, 2016

REFERENCES:

Kazimi S.M.A, “Solid Mechanics”, Tata McGraw-Hill Publishing Co., New Delhi, 2003
William A .Nash, “Theory and Problems of Strength of Materials”, Schaum,s Outline Series, Tata McGraw Hill Publishing company, 2007.
Singh. D.K., “ Strength of Materials”, Ane Books Pvt. Ltd., New Delhi, 2016
Egor P Popov, “Engineering Mechanics of Solids”, 2nd edition, PHI Learning Pvt. Ltd., New Delhi, 2012

CE8403 APPLIED HYDRAULIC ENGINEERING LTPC 3003

OBJECTIVE:

To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering.

UNIT I UNIFORM FLOW 9

Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Velocity distribution in open channel - Steady uniform flow: Chezy equation, Manning equation - Best hydraulic sections for uniform flow – Wide open channel - Specific energy and specific force – Critical flow .

UNIT II GRADUALLY VARIED FLOW 9

Dynamic equations of gradually varied flows – Types of flow profiles - Classifications: Computation by Direct step method and Standard step method – Control section – Break in Grade – Computation.

UNIT III RAPIDLY VARIED FLOW 9

Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation – Celerity – Rapidly varied unsteady flows (positive and negative surges)

UNIT IV TURBINES 9

Impact of Jet on flat, curved plates, Stationary and Moving –Classification of Turbines – Pelton wheel – Francis turbine – Kaplan turbine - Specific speed – Characteristic Curves of Turbines- Draft tube and cavitation.

UNIT V PUMPS 9

Classification of Pumps - Centrifugal pumps – Work done - Minimum speed to start the pump - NPSH - Multistage pumps – Characteristics curve - Reciprocating pumps - Negative slip - Indicator diagrams and its variations – Air vessels - Savings in work done.

TOTAL : 45 PERIODS

OUTCOMES:

On completion of this course the students will be able to

Apply their knowledge of fluid mechanics in addressing problems in open channels.
Able to identify a effective section for flow in different cross sections.
To solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
Understand the principles, working and application of turbines.
Understand the principles, working and application of pumps.

TEXTBOOKS:

Subramanya.K ,"Flow in open channels", Tata McGraw Hill, New Delhi, 2000.
Modi P.N and Seth.S.M "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi, 2009.
Chandramouli P.N.,"Applied Hydraulic Engineering", Yes Dee Publishing Pvt. Ltd., 2017.

REFERENCES:

Ven Te Chow, "Open Channel Hydraulics", McGraw Hill, New York, 2009.
Hanif Chaudhry.M., "Open Channel Flow", Second Edition, Springer, 2007.
Rajesh Srivastava, "Flow through open channels", Oxford University Press, New Delhi, 2008.
Jain.A.K., " Fluid Mechanics" (Including Hydraulic Machines), Khanna Publishers, Twelfth Edition, 2016.
Subramanya.K., " Fluid Mechanics and Hydraulic Machines", Tata McGraw Hill Education Private Limited, New Delhi, 2010.

CE8404 CONCRETE TECHNOLOGY LTPC
3 003

OBJECTIVE:

To impart knowledge to the students on the properties of materials for concrete by suitable tests, mix design for concrete and special concretes.

UNIT I CONSTITUENT MATERIALS 9

Cement - Different types - Chemical composition and Properties – Hydration of cement - Tests on cement - IS Specifications - Aggregates – Classification - Mechanical properties and tests as per BIS - Grading requirements – Water - Quality of water for use in concrete.

UNIT II CHEMICAL AND MINERAL ADMIXTURES 9

Accelerators – Retarders - Plasticizers - Super plasticizers - Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline - Effects on concrete properties.

UNIT III PROPORTIONING OF CONCRETE MIX 9

Principles of Mix Proportioning - Properties of concrete related to Mix Design - Physical properties of materials required for Mix Design - Design Mix and Nominal Mix - BIS Method of Mix Design - Mix Design Examples

UNIT IV FRESH AND HARDENED PROPERTIES OF CONCRETE 9

Workability - Tests for workability of concrete - Segregation and Bleeding - Determination of strength Properties of Hardened concrete - Compressive strength – split tensile strength - Flexural strength - Stress-strain curve for concrete - Modulus of elasticity – durability of concrete – water absorption – permeability – corrosion test – acid resistance.

UNIT V SPECIAL CONCRETES 9

Light weight concretes - foam concrete- self compacting concrete – vacuum concrete - High strength concrete - Fibre reinforced concrete – Ferrocement - Ready mix concrete – SIFCON - Shotcrete – Polymer concrete - High performance concrete - Geopolymer Concrete

TOTAL: 45 PERIODS

OUTCOMES:

Students will be able to understand

The various requirements of cement, aggregates and water for making concrete
The effect of admixtures on properties of concrete
The concept and procedure of mix design as per IS method
The properties of concrete at fresh and hardened state
The importance and application of special concretes.

TEXTBOOKS:

Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.
Shetty,M.S, "Concrete Technology", S.Chand and Company Ltd, New Delhi, 2003
Bhavikatti.S.S, " Concrete Technology", I.K.International Publishing House Pvt. Ltd., New Delhi, 2015
Santhakumar. A.R., "Concrete Technology", Oxford University Press India, 2006.

REFERENCES:

Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London, 1995
Gambhir, M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007
IS10262-2009 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 1998.
Job Thomas, "Concrete Technology", Cengage Learning India Pvt. Ltd., Delhi, 2015
Kumar P Mehta., Paulo J M Monterio., "Concrete - Microstructure, Properties and Materials", McGraw Hill Education (India) Private Limited, New Delhi, 2016

CE8491 SOIL MECHANICS LTPC 3003

OBJECTIVE:

To impart knowledge to classify the soil based on index properties and to assess their engineering properties based on the classification. To familiarize the students about the fundamental concepts of compaction, flow through soil, stress transformation, stress distribution, consolidation and shear strength of soils. To impart knowledge of design of both finite and infinite slopes.

UNIT I SOIL CLASSIFICATION AND COMPACTION 9

History – formation and types of soil – composition - Index properties – clay mineralogy structural arrangement of grains – description – Classification – BIS – US – phase relationship – Compaction – theory – laboratory and field technology – field Compaction method – factors influencing compaction.

UNIT II EFFECTIVE STRESS AND PERMEABILITY 9

Soil - water – Static pressure in water - Effective stress concepts in soils – Capillary phenomena– – Permeability – Darcy,s law – Determination of Permeability – Laboratory Determination (Constant head and falling head methods) and field measurement pumping out in unconfined and confined aquifer – Factors influencing permeability of soils – Seepage - Two dimensional flow – Laplace,s equation – Introduction to flow nets – Simple problems Sheet pile and wier.

UNIT III STRESS DISTRIBUTION AND SETTLEMENT 9

Stress distribution in homogeneous and isotropic medium – Boussines of theory – (Point load, Line load and udl) Use of Newmarks influence chart –Components of settlement – Immediate and consolidation settlement – Factors influencing settlement – Terzaghi,s one dimensional consolidation theory – Computation of rate of settlement. – √t and log t methods. e-log p relationship consolidation settlement N-C clays – O.C clays – Computation.

UNIT IV SHEAR STRENGTH 9

Shear strength of cohesive and cohesion less soils – Mohr-Coulomb failure theory – shear strength - Direct shear, Triaxial compression, UCC and Vane shear tests – Pore pressure parameters – Factors influences shear strength of soil.

UNIT V SLOPE STABILITY 9

Infinite slopes and finite slopes –– Friction circle method – Use of stability number –Guidelines for location of critical slope surface in cohesive and c - Φ soil – Slope protection measures.

TOTAL: 45 PERIODS

OUTCOMES:

Students will be able to

- classify the soil and assess the engineering properties, based on index properties.
- Understand the stress concepts in soils
- Understand and identify the settlement in soils.
- Determine the shear strength of soil
- Analyze both finite and infinite slopes.

TEXTBOOKS:

Murthy, V.N.S., “Text book of Soil Mechanics and Foundation Engineering”, CBS Publishers Distribution Ltd., New Delhi. 2014

Arora, K.R., “Soil Mechanics and Foundation Engineering”, Standard Publishers and Distributors, New Delhi, 7th Edition, 2017(Reprint).

Gopal Ranjan, A S R Rao, “Basic and Applied Soil Mechanics” New Age International Publication, 3rd Edition, 2016.

Punmia, B.C., “Soil Mechanics and Foundations”, Laxmi Publications Pvt. Ltd. New Delhi, 16th Edition, 2017.

REFERENCES:

McCarthy, D.F., “Essentials of Soil Mechanics and Foundations: Basic Geotechnics”. Prentice-Hall, 2006.

Coduto, D.P., “Geotechnical Engineering – Principles and Practices”, Prentice Hall of India Pvt. Ltd. New Delhi, 2010.

Braja M Das, “Principles of Geotechnical Engineering”, Cengage Learning India Private Limited, 8th Edition, 2014.

Palanikumar.M., “Soil Mechanics”, Prentice Hall of India Pvt. Ltd, Learning Private Limited Delhi, 2013.

Craig.R.F., “Soil Mechanics”, E & FN Spon, London and New York, 2012.

Purushothama Raj. P., “Soil Mechanics and Foundations Engineering”,2nd Edition, Pearson Education, 2013.

Venkatramaiah.C., “Geotechnical Engineering”, New Age International Pvt. Ltd., New Delhi, 2017

CE8481 STRENGTH OF MATERIALS LABORATORY LT PC 0042

OBJECTIVE:

To expose the students to the testing of different materials under the action of various forces and determination of their characteristics experimentally.

LIST OF EXPERIMENTS

- Tension test on steel rod
- Compression test on wood
- Double shear test on metal
- Torsion test on mild steel rod

Impact test on metal specimen (Izod and Charpy)
Hardness test on metals (Rockwell and Brinell Hardness Tests)
Deflection test on metal beam
Compression test on helical spring
Deflection test on carriage spring

TOTAL: 60 PERIODS

OUTCOME:

The students will have the required knowledge in the area of testing of materials and components of structural elements experimentally.

REFERENCES:

Strength of Materials Laboratory Manual, Anna University, Chennai - 600 025.
IS1786-2008 (Fourth Revision, Reaffirmed 2013), ˆHigh strength deformed bars and wires for concrete reinforcement – Specification,, 2008.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

Sl. No.	Description of Equipment	Quantity
1.	UTM of minimum 400 kN capacity	1
2.	Torsion testing machine	1
3.	Izod impact testing machine	1
4.	Hardness testing machine Rockwell Vicker,s } (any 2) Brinnel	1 each
5.	Beam deflection test apparatus	1
6.	Extensometer	1
7.	Compressometer	1
8.	Dial gauges	Few
9.	Le Chatelier,s apparatus	2
10.	Vicat,s apparatus	2
11.	Mortar cube moulds	10

CE8461 HYDRAULIC ENGINEERING LABORATORY L T P C
0 0 4 2

OBJECTIVE:

Students should be able to verify the principles studied in theory by performing the experiments in lab.

LIST OF EXPERIMENTS

A. Flow Measurement

Calibration of Rotameter
Calibration of Venturimeter / Orificemeter
Bernoulli,s Experiment

B.Losses in Pipes

4.Determination of friction factor in pipes
5. Determination of min or losses

C. Pumps

Characteristics of Centrifugal pumps
Characteristics of Gear pump
Characteristics of Submersible pump
Characteristics of Reciprocating pump

D. Turbines

Characteristics of Pelton wheel turbine
Characteristics of Francis turbine/Kaplan turbine

E. Determination of Metacentric height

12.Determination of Metacentric height of floating bodies

TOTAL: 60 PERIODS

OUTCOMES:

The students will be able to measure flow in pipes and determine frictional losses.
The students will be able to develop characteristics of pumps and turbines.

REFERENCES:

Sarbjit Singh."Experiments in Fluid Mechanics", Prentice Hall of India Pvt. Ltd, Learning Private Limited, Delhi, 2009.
"Hydraulic Laboratory Manual", Centre for Water Resources, Anna University, 2004.
Modi P.N. and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi, 2000.
Subramanya K. "Flow in open channels", Tata McGraw Hill Publishing.Company, 2001.

LIST OF EQUIPMENTS

One set up of Rotometer
One set up of Venturimeter/Orifice meter
One Bernoulli,s Experiment set up
One set up of Centrifugal Pump
One set up of Gear Pump
One set up of Submersible pump
One set up of Reciprocating Pump
One set up of Pelton Wheel turbine
One set up of Francis turbines/one set of kaplon turbine
One set up of equipment for determination of Metacentric height of floating bodies
One set up for determination of friction factor in pipes
One set up for determination of minor losses.

HS8461	ADVANCED READING AND WRITING	L	T	P	C
		0	0	2	1

OBJECTIVES:

Strengthen the reading skills of students of engineering.
Enhance their writing skills with specific reference to technical writing.
Develop students, critical thinking skills.
Provide more opportunities to develop their project and proposal writing skills.

UNIT I

Reading - Strategies for effective reading-Use glosses and footnotes to aid reading comprehension- Read and recognize different text types-Predicting content using photos and title Writing-Plan before writing- Develop a paragraph: topic sentence, supporting sentences, concluding sentence –Write a descriptive paragraph

UNIT II

Reading-Read for details-Use of graphic organizers to review and aid comprehension Writing- State reasons and examples to support ideas in writing- Write a paragraph with reasons and examples- Write an opinion paragraph

UNIT III

Reading- Understanding pronoun reference and use of connectors in a passage- speed reading techniques-Writing- Elements of a good essay-Types of essays- descriptive-narrative- issue-based-argumentative-analytical.

UNIT IV

Reading- Genre and Organization of Ideas- Writing- Email writing- visumes – Job application-project writing-writing convincing proposals.

UNIT V

Reading- Critical reading and thinking- understanding how the text positions the reader- identify Writing- Statement of Purpose- letter of recommendation- Vision statement

TOTAL: 30 PERIODS

OUTCOMES:

At the end of the course Learners will be able to:

Write different types of essays.
Write winning job applications.
Read and evaluate texts critically.
Display critical thinking in various professional contexts.

TEXT BOOKS:

Gramer F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011

Debra Daise, CharlNorloff, and Paul Carne Reading and Writing (Level 4) Oxford University Press: Oxford, 2011

REFERENCES

Davis, Jason and Rhonda LIss.Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006

Suresh Kumar.E and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan: Hyderabad, 2012

Withrow, Jeans and et al. Inspired to Write. Readings and Tasks to develop writing skills. Cambridge University Press: Cambridge, 2004

Goatly, Andrew. Critical Reading and Writing. Routledge: United States of America, 2000

Petelin, Roslyn and Marsh Durham. The Professional Writing Guide: Knowing Well and Knowing Why. Business & Professional Publishing: Australia, 2004

CE8501 DESIGN OF REINFORCED CEMENT CONCRETE ELEMENTS

L	T	P	C
3	2	0	4

OBJECTIVES:

To introduce the different types of philosophies related to design of basic structural elements such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice.

UNIT I INTRODUCTION 9+6

Objective of structural design-Steps in RCC Structural Design Process- Type of Loads on Structures and Load combinations- Code of practices and Specifications - Concept of Working Stress Method, Ultimate Load Design and Limit State Design Methods for RCC –Properties of Concrete and Reinforcing Steel - Analysis and Design of Singly reinforced Rectangular beams by working stress method - Limit State philosophy as detailed in IS code - Advantages of Limit State Method over other methods - Analysis and design of singly and doubly reinforced rectangular beams by Limit State Method.

UNIT II DESIGN OF BEAMS 9+6

Analysis and design of Flanged beams for – Use of design aids for Flexure - Behaviour of RC members in Shear, Bond and Anchorage - Design requirements as per current code - Behaviour of rectangular RC beams in shear and torsion - Design of RC members for combined Bending, Shear and Torsion.

UNIT III DESIGN OF SLABS AND STAIRCASE 9+6

Analysis and design of cantilever, one way simply supported and continuous slabs and supporting beams-Two way slab- Desingn of simply supported and continuous slabs using IS code coefficients- Types of Staircases – Design of dog-legged Staircase.

UNIT IV DESIGN OF COLUMNS 9+6

Types of columns –Axially Loaded columns – Design of short Rectangula Square and circular columns –Design of Slender columns- Design for Uniaxial and Biaxial bending using Column Curves

UNIT V DESIGN OF FOOTINGS 9+6

Concepts of Proportioning footings and foundations based on soil properties-Design of wall footing – Design of axially and eccentrically loaded Square, Rectangular pad and sloped footings – Design of Combined Rectangular footing for two columns only.

TOTAL: 75 PERIODS

OUTCOMES:

Students will be able to

Understand the various design methodologies for the design of RC elements.

Know the analysis and design of flanged beams by limit state method and sign of beams for shear, bond and torsion.

design the various types of slabs and staircase by limit state method.

Design columns for axial, uniaxial and biaxial eccentric loadings.

Design of footing by limit state method.

TEXT BOOKS:

Varghese, P.C., “Limit State Design of Reinforced Concrete”, Prentice Hall of India, Pvt. Ltd., New Delhi, 2002.

Gambhir. M.L., "Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private Limited, New Delhi, 2006.

Subramanian,N.,”Design of Reinforced Concrete Structures”,Oxford University Press, New Delhi, 2013.

Krishnaraju.N “ Design of Reinforced Concrete Structurres “, CBS Publishers & Distributors Pvt. Ltd., New Delhi.

Ramachandra, “Limit state Design of Concrete Structures“ Standard Book House, New Delhi

REFERENCES:

Jain, A.K., “Limit State Design of RC Structures”, Nemchand Publications, Roorkee, 1998

Sinha, S.N., “Reinforced Concrete Design”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2002

Unnikrishna Pillai, S., Devdas Menon, “Reinforced Concrete Design”, Tata McGraw Hill Publishing Company Ltd., 2009

Punmia. B.C., Ashok Kumar Jain, Arun Kumar Jain, “Limit State Design of Reinforced Concrete”, Laxmi Publication Pvt. Ltd., New Delhi, 2007.

Bandyopadhyay. J.N., "Design of Concrete Structures"., Prentice Hall of India Pvt. Ltd., New Delhi, 2008.

IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2000

SP16, IS456:1978 “Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi, 1999

Shah V L Karve S R., "Limit State Theory and Design of Reinforced Concrete", Structures Publilcations, Pune, 2013

CE8502 STRUCTURAL ANALYSIS I L T P C
3003

OBJECTIVE:

To introduce the students to basic theory and concepts of classical methods of structural analysis

UNITI STRAIN ENERGY METHOD 9

Determination of Static and Kinematic Indeterminacies – Analysis of continuous beams, plane frames and indeterminate plane trusses by strain energy method (up to two degree of redundancy).

UNITII SLOPE DEFLECTION METHOD 9

Slope deflection equations – Equilibrium conditions - Analysis of continuous beams and rigid frames – Rigid frames with inclined members - Support settlements- symmetric frames with symmetric and skew-symmetric loadings.

UNITIII MOMENT DISTRIBUTION METHOD 9

Stiffness and carry over factors – Distribution and carryover of moments - Analysis of continuous Beams- Plane rigid frames with and without sway – Support settlement - symmetric frames with symmetric and skew-symmetric loadings.

UNITIV FLEXIBLITY METHOD 9

Primary structures - Compatibility conditions – Formation flexibility matrices - Analysis of indeterminate pin- jointed plane frames, continuous beams and rigid jointed plane frames by direct flexibility approach.

UNITV STIFFNESS METHOD 9

Restrained structure –Formation of stiffness matrices - equilibrium condition - Analysis of Continuous Beams, Pin-jointed plane frames and rigid frames by direct stiffness method.

TOTAL: 45 PERIODS

OUTCOMES:

Students will be able to

Analyze continuous beams, pin-jointed indeterminate plane frames and rigid plane frames by strain energy method

Analyse the continuous beams and rigid frames by slope defection method.

Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway.

Analyse the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method.

Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.

TEXTBOOKS:

Bhavikatti, S.S,Structural Analysis,Vol.1,& 2, Vikas Publishing House Pvt.Ltd.,NewDelhi-4, 2014.

Bhavikatti, S.S, Matrix Method of Structural Analysis, I. K. International Publishing House Pvt.Ltd.,New Delhi-4, 2014.

Vazrani.V.N And Ratwani, M.M, Analysis of Structures, Vol.II, Khanna Publishers, 2015.

Pandit G.S.andGupta S.P.,Structural Analysis–AMatrix Approach, Tata McGraw Hill Publishing Company Ltd.,2006

REFERENCES:

Punmia. B.C, Ashok Kumar Jain & Arun Kumar Jain, Theory of structures, Laxmi Publications, New Delhi, 2004.

William Weaver, Jrand James M.Gere, Matrix analysis of framed structures, CBS Publishers & Distributors, Delhi,1995

Hibbeler, R.C.,Structural Analysis, VII Edition, Prentice Hall, 2012.

Reddy.C.S, “Basic Structural Analysis”,Tata McGraw Hill Publishing Company,2005.

Rajasekaran. S, & G. Sankarasubramanian., “Computational Structural Mechanics”, PHI Learning Pvt. Ltd, 2015

Negi L.S.and Jangid R.S.,Structural Analysis, Tata McGraw Hill Publishing Co.Ltd.2004.

EN8491 WATER SUPPLY ENGINEERING L T P C

3 0 0 3

OBJECTIVE:

To equip the students with the principles and design of water treatment units and distribution system.

UNIT I SOURCES OF WATER 9

Public water supply system – Planning, Objectives, Design period, Population forecasting; Water demand – Sources of water and their characteristics, Surface and Groundwater – Impounding Reservoir – Development and selection of source – Source Water quality – Characterization – Significance – Drinking Water quality standards.

UNIT II CONVEYANCE FROM THE SOURCE 9

Water supply – intake structures – Functions; Pipes and conduits for water – Pipe materials – Hydraulics of flow in pipes – Transmission main design – Laying, jointing and testing of pipes – appurtenances – Types and capacity of pumps – Selection of pumps and pipe materials.

UNIT III WATER TREATMENT **9**

Objectives – Unit operations and processes – Principles, functions, and design of water treatment plant units, aerators of flash mixers, Coagulation and flocculation –Clarifloccuator-Plate and tube settlers - Pulsator clarifier - sand filters - Disinfection - Residue Management –Construction, Operation and Maintenance aspects.

UNIT IV ADVANCED WATER TREATMENT **9**

Water softening – Desalination- R.O. Plant – demineralization – Adsorption - Ion exchange– Membrane Systems – RO Reject Management - Iron and Manganese removal - Defluoridation - Construction and Operation & Maintenance aspects – Recent advances - MBR process

UNIT V WATER DISTRIBUTION AND SUPPLY **9**

Requirements of water distribution – Components – Selection of pipe material – Service reservoirs – Functions – Network design – Economics – Analysis of distribution networks -Computer applications – Appurtenances – Leak detection.

Principles of design of water supply in buildings – House service connection – Fixtures and fittings, systems of plumbing and types of plumbing.

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will have

an insight into the structure of drinking water supply systems, including water transport, treatment and distribution

the knowledge in various unit operations and processes in water treatment

an ability to design the various functional units in water treatment

an understanding of water quality criteria and standards, and their relation to public health

the ability to design and evaluate water supply project alternatives on basis of chosen criteria.

TEXTBOOKS:

Garg, S.K. Environmental Engineering, Vol.IKhanna Publishers, New Delhi, 2010.

Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2010.

Punmia, B.C.,Ashok Jain and Arun Jain, Water Supply Engineering, Laxmi Publications Ltd., New Delhi, 2014.

REFERENCES:

Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.

Syed R. Qasim and Edward M. Motley Guang Zhu, Water Works Engineering Planning, Design and Operation, Prentice Hall of India Learning Private Limited, New Delhi, 2009.

CE8591 FOUNDATION ENGINEERING **LT PC 3003**

OBJECTIVE:

To impart knowledge to plan and execute a detail site investigation programme, to select geotechnical design parameters and type of foundations. Also to familiarize the students for the geotechnical design of different type of foundations and retaining walls.

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION 9

Scope and objectives – Methods of exploration – Auguring and boring – Wash boring and rotary drilling – Depth and spacing of bore holes – Soil samples – Representative and undisturbed – Sampling methods – Split spoon sampler, Thin wall sampler, Stationary piston sampler – Penetration tests (SPT and SCPT) – Data interpretation - Strength parameters - Bore log report and Selection of foundation.

UNIT II SHALLOW FOUNDATION 9

Location and depth of foundation – Codal provisions – Bearing capacity of shallow foundation on homogeneous deposits – Terzaghi,s formula and BIS formula – Factors affecting bearing capacity – Bearing capacity from in-situ tests (SPT, SCPT and plate load) – Allowable bearing pressure – Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits – Total and differential settlement – Allowable settlements – Codal provision – Methods of minimizing total and differential settlements.

UNIT III FOOTINGS AND RAFTS 9

Types of Isolated footing, Combined footing, Mat foundation – Contact pressure and settlement distribution – Proportioning of foundations for conventional rigid behaviour – Minimum thickness for rigid behaviour – Applications – Compensated foundation – Codal provision

UNIT IV PILE FOUNDATION 9

Types of piles and their functions – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil – Static formula – Dynamic formulae (Engineering news and Hileys) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – Uplift capacity-Group capacity by different methods (Feld,s rule, Converse – Labarra formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test (routine test only), Under reamed piles – Capacity under compression and uplift – Cohesive – expansive – non expansive – Cohesionless soils – Codal provisions.

UNIT V RETAINING WALLS 9

Plastic equilibrium in soils – Active and passive states – Rankine,s theory – Cohesionless and cohesive soil – Coulomb,s wedge theory – Condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Culmann,s Graphical method – Pressure on the wall due to line load – Stability analysis of retaining walls – Codal provisions.

TOTAL: 45 PERIODS

OUTCOMES:

Students will be able to

Understand the site investigation, methods and sampling.
Get knowledge on bearing capacity and testing methods.
Design shallow footings.
Determine the load carrying capacity, settlement of pile foundation.
Determine the earth pressure on retaining walls and analysis for stability.

TEXTBOOKS:

Murthy, V.N.S., “Text book of Soil Mechanics and Foundation Engineering”, CBS Publishers Distribution Ltd., New Delhi. 2014.

Arora, K.R., “Soil Mechanics and Foundation Engineering”, Standard Publishers and Distributors, New Delhi, 7th Edition, 2017 (Reprint).

Punmia, B.C., “Soil Mechanics and Foundations”, Laxmi Publications Pvt. Ltd. New Delhi, 16th Edition 2017.

REFERENCES:

Braja M Das, “Principles of Foundation Engineering” (Eigth edition), Cengage Learning 2014.

Kaniraj, S.R. “Design aids in Soil Mechanics and Foundation Engineering”, Tata McGraw Hill publishing company Ltd., New Delhi, 2014.

Joseph E bowles, “Foundation Analysis and design”, McGraw Hill Education, 5th Edition, 28th August 2015.

IS Code 6403 : 1981 (Reaffirmed 1997) “Bearing capacity of shallow foundation”, Bureau of Indian Standards, New Delhi.

IS Code 8009 (Part 1):1976 (Reaffirmed 1998) “Shallow foundations subjected to symmetrical static vertical loads”, Bureau of Indian Standards, New Delhi.

IS Code 8009 (Part 2):1980 (Reaffirmed 1995) “Deep foundations subjected to symmetrical static vertical loading”, Bureau of Indian Standards, New Delhi.

IS Code 2911 (Part 1): 1979 (Reaffirmed 1997) “Concrete Piles” Bureau of Indian Standards, New Delhi.

IS Code 2911 (Part 2): 1979 (Reaffirmed 1997) “Timber Piles”, Bureau of Indian Standards, New Delhi.

IS Code 2911 (Part 3) : 1979 (Reaffirmed 1997) “Under Reamed Piles”, Bureau of Indian Standards, New Delhi.

IS Code 2911 (Part 4) : 1979 (Reaffirmed 1997) “Load Test on Piles”, Bureau of Indian Standards, New Delhi.

IS Code 1904: 1986 (Reaffirmed 1995) “Design and Construction of Foundations in Soils”, Bureau of Indian Standards, New Delhi.

IS Code 2131: 1981 (Reaffirmed 1997) “Method for Standard Penetration test for Soils”, Bureau of Indian Standards, New Delhi.

IS Code 2132: 1986 (Reaffirmed 1997) “Code of Practice for thin – walled tube sampling for soils”, Bureau of Indian Standards, New Delhi.

IS Code 1892 (1979): Code of Practice for subsurface Investigation for Foundations. Bureau of Indian Standards, New Delhi.

IS Code 14458 (Part 1) : 1998 “Retaining Wall for Hill Area – Guidelines, Selection of Type of Wall” , Bureau of Indian Standards, New Delhi.

IS Code 14458 (Part 2) : 1998 “Retaining Wall for Hill Area – Guidelines, Design of Retaining/Breast Walls” , Bureau of Indian Standards, New Delhi.

IS Code 14458 (Part 3) : 1998 “Retaining Wall for Hill Area – Guidelines, Construction Of Dry Stone Walls” , Bureau of Indian Standards, New Delhi.

CE8511 SOIL MECHANICS LABORATORY LTPC

0 042

OBJECTIVE:

To develop skills to test the soils for their index and engineering properties and to characterise the soil based on their properties.

EXERCISES:

1. DETERMINATION OF INDEX PROPERTIES 20

a. Specific gravity of soil solids
b. Grain size distribution – Sieve analysis
c. Grain size distribution - Hydrometer analysis
d. Liquid limit and Plastic limit tests
e. Shrinkage limit and Differential free swell tests

2. DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS 12

a. Field density Test (Sand replacement method and core cutter method)
b. Determination of moisture – density relationship using standard Proctor compaction test.
c. Determination of relative density (Demonstration only)

3. DETERMINATION OF ENGINEERING PROPERTIES 28

a. Permeability determination (constant head and falling head methods)
b. One dimensional consolidation test (Determination of Co-efficient of consolidation only) c. Direct shear test in cohesionless soil
d. Unconfined compression test in cohesive soil
e. Laboratory vane shear test in cohesive soil
f. Tri-axial compression test in cohesionless soil (Demonstration only)
g. California Bearing Ratio Test

TOTAL: 60 PERIODS

OUTCOME:

Students are able to conduct tests to determine both the index and engineering properties of soils and to characterize the soil based on their properties.

REFERENCES:

"Soil Engineering Laboratory Instruction Manual" published by Engineering College Cooperative Society, Anna University, Chennai, 2010.

Lambe T.W., "Soil Testing for Engineers", John Wiley and Sons, New York, 1951. Digitized 2008.

Saibaba Reddy, E.Ramasastri, K. "Measurement of Engineering Properties of Soils" New age International (P) Limited Publishers, New Delhi, 2002.

IS Code of Practice (2720) Relevant Parts, as amended from time to time, Bureau of Indian Standards, New Delhi.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

Sl.No.	Description of Equipment	Quantity
1.	Sieves	2 sets
2.	Hydrometer	2 sets
3.	Liquid and Plastic limit apparatus	2 sets
4.	Shrinkage limit apparatus	3 sets
5.	Proctor Compaction apparatus	2 sets
6.	UTM of minimum of 20kN capacity	1
7.	Direct Shear apparatus	1
8.	Thermometer	2
9.	Sand replacement method accessories and core cutter method accessories	2
10.	Tri-axial Shear apparatus	1
11.	Three Gang Consolidation test device	1
12.	Relative Density apparatus	1
13.	Van Shear apparatus	1
14.	Weighing machine – 20kg capacity	1 No
15.	Weighing machine – 1kg capacity	3 No

CE8512 WATER AND WASTE WATER ANALYSIS LABORATORY LTPC
0042

COURSE OBJECTIVES:

To analyse the physical, chemical and biological characteristics of water and wastewater
To quantify the dosage requirement for coagulation process
To study the growth of micro-organism and its quantification
To quantify the sludge

Course Content:

Physical, Chemical and biological characteristics of water and wastewater
Jar test
Chlorine demand and residual test
Growth of micro-organism

COURSE OUTCOME:

On the completion of the course, the students will be able to:

Quantify the pollutant concentration in water and wastewater
Suggest the type of treatment required and amount of dosage required for the treatment
Examine the conditions for the growth of micro-organisms

TOTAL: 60 PERIODS

List of Experiments:

Determination of pH, Turbidity and conductivity
Determination of Hardness
Determination of Alkalinity and Acidity
Determination of Chlorides
Determination of Phosphates and Sulphates
Determination of iron and fluoride
Determination of Optimum Coagulant dosage
Determination of residual chlorine and available chlorine in bleaching powder
Determination of Oil, and Grease
Determination of suspended, settleable, volatile and fixed solids
Determination Dissolved Oxygen and BOD for the given sample
Determination of COD for given sample
Determination of SVI of Biological sludge and microscopic examination
Determination of MPN index of given water sample

CE8513 SURVEY CAMP LTPC
(During IV semester Summer Vacation 2 weeks) ---2

The objective of the survey camp is to enable the students to get practical training in the field work. Groups of not more than six members in a group will carry out each exercise in survey camp. The camp must involve work on a large area of not less than 40 acres outside the campus (Survey camp should not be conducted inside the campus). At the end of the camp, each student shall have mapped and contoured the area. The camp record shall include all original field observations, calculations and plots.

Two weeks Survey Camp will be conducted during summer vacation in the following activities:

Traverse - using Total station
Contouring
(i). Radial tachometric contouring - Radial Line at Every 45 Degree and Length not less than 60 Meter on each Radial Line

(ii). Block Level/ By squares of size at least 100 Meter x 100 Meter atleat 20 Meter interval

(III). L.S & C.S - Road and canal alignment for a Length of not less than 1 Kilo Meter atleast L.S at Every 30M and C.S at every 90 M

Offset of Buildings and Plotting the Location

Sun observation to determine azimuth (guidelines to be given to the students)

Use of GPS to determine latitude and longitude and locate the survey camp location

Traversing using GPS

Curve setting by deflection angle

Apart from above students may be given survey exercises in other area also based on site condition to give good exposure on survey.

CE8601 DESIGN OF STEEL STRUCTURAL ELEMENTS LTPC
3 204

OBJECTIVE:

To introduce the students to limit state design of structural steel members subjected to compressive, tensile and bending loads, including connections. Design of structural systems such as roof trusses, gantry girders as per provisions of current code (IS 800 - 2007) of practice for working stress and Limit state Method.

UNIT I INTRODUCTION AND ALLOWABLE STRESS DESIGN 9+6

Structural steel types – Mechanical Properties of structural steel- Indian structural steel products- Steps involved in the Deign Process -Steel Structural systems and their Elements- -Type of Loads on Structures and Load combinations- Code of practices, Loading standards and Specifications - Concept of Allowable Stress Method, and Limit State Design Methods for Steel structures-Relative advantages and Limitations-Strengths and Serviceability Limit states.

Allowable stresses as per IS 800 section 11 -Concepts of Allowable stress design for bending and Shear –Check for Elastic deflection-Calculation of moment carrying capacity –Design of Laterally supported Solid Hot Rolled section beams-Allowable stress deign of Angle Tension and Compression Members and estimation of axial load carrying capacity.

UNIT II CONNECTIONS IN STEEL STRUCTURES 9+6

Type of Fasteners- Bolts Pins and welds- Types of simple bolted and welded connections Relative advantages and Limitations-Modes of failure-the concept of Shear lag-efficiency of joints- Axially loaded bolted connections for Plates and Angle Members using bearing type bolts –Prying forces and Hanger connection– Design of Slip critical connections with High strength Friction Grip bolts.- Design of joints for combined shear and Tension- Eccentrically Loaded Bolted Bracket Connections- Welds-symbols and specifications- Effective area of welds-Fillet and but Welded connections-Axially Loaded connections for Plate and angle truss members and Eccentrically Loaded bracket connections.

UNIT III TENSION MEMBERS 9+6

Tension Members - Types of Tension members and sections –Behaviour of Tension Members-modes of failure-Slenderness ratio- Net area – Net effective sections for Plates ,Angles and Tee in tension –Concepts of Shear Lag- Design of plate and angle tension members-design of built up tension Members-Connections in tension members – Use of lug angles – Design of tension splice.

UNIT IV COMPRESSION MEMBERS 9+6

Types of compression members and sections–Behaviour and types of failures-Short and slender columns- Current code provisions for compression members- Effective Length, Slenderness ratio –Column formula and column curves- Design of single section and compound Angles-Axially Loaded solid section Columns- Design of Built up Laced and Battened type columns – Design of column bases – Plate and Gusseted bases for Axially loaded colums- Splices for colums.

UNIT V DESIGN OF FLEXURAL MEMBERS 9+6

Types of steel Beam sections- Behaviour of Beams in flexure- Codal Provisions – Classification of cross sections- Flexural Strength and Lateral stability of Beams –Shear Strength-Web Buckling, Crippling and defection of Beams- Design of laterally supported Beams- Design of solid rolled section Beams- Design of Plated beams with cover plates - Design Strength of Laterally unsupported Beams – Design of laterally unsupported rolled section Beams- Purlin in Roof Trusses-Design of Channel and I section Purlins.

TOTAL: 75 PERIODS

OUTCOMES:

Students will be able to

Understand the concepts of various design philosophies

Design common bolted and welded connections for steel structures

Design tension members and understand the effect of shear lag.

Understand the design concept of axially loaded columns and column base connections.

Understand specific problems related to the design of laterally restrained and unrestrained steel beams.

TEXTBOOKS:

Subramanian.N, "Design of Steel Structures", Oxford University Press, New Delhi, 2013.

Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt. Ltd., 2013

Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, 2005

REFERENCES:

Narayanan.R.et.al. "Teaching Resource on Structural Steel Design", INSDAG, Ministry of Steel Publications, 2002

Sai Ram. K.S. “Design of Steel Structures “ Dorling Kindersley (India) Pvt. Ltd., New Delhi, 2nd Edition, 2015, www.pearsoned.co.in/kssairam

Shiyekar. M.R., "Limit State Design in Structural Steel", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2nd Edition, 2013

Bhavikatti.S.S, "Design of Steel Structures" By Limit State Method as per IS:800– 2007, IK International Publishing House Pvt. Ltd., 2009

Shah.V.L. and Veena Gore, "Limit State Design of Steel Structures", IS 800–2007, Structures Publications, 2009.

IS800 :2007, General Construction in Steel - Code of Practice, (Third Revision), Bureau of Indian Standards, New Delhi, 2007

SP 6(1) Hand book on structural Steel Sections

CE8602 STRUCTURAL ANALYSIS II LTPC

3 003

OBJECTIVES :

To learn the method of drawing influence lines and its uses in various applications like beams and plane trusses.

To analyse the arches, suspension bridges and space trusses.

Also to learn Plastic analysis of beams and rigid frames.

UNITI INFLUENCE LINES FOR DETERMINATE BEAMS 9

Influence lines for reactions in statically determinate beams – Influence lines for shear force and bending moment – Calculation of critical stress resultants due to concentrated and distributed moving loads – absolute maximum bending moment - influence lines for member forces in pin jointed plane frames.

UNITII INFLUENCE LINES FOR INDETERMINATE BEAMS 9

Muller Breslau,s principle– Influence line for Shearing force, Bending Moment and support reaction components of propped cantilever, continuous beams (Redundancy restricted to one), and fixed beams.

UNIT III ARCHES 9

Arches - Types of arches – Analysis of three hinged, two hinged and fixed arches - Parabolic and circular arches – Settlement and temperature effects.

UNIT IV CABLES AND SUSPENSION BRIDGES 9

Equilibrium of cable – length of cable - anchorage of suspension cables – stiffening girders - cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders.

UNITV PLASTIC ANALYSIS 9

Plastic theory - Statically indeterminate structures – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – collapse load - Static and kinematic methods – Upper and lower bound theorems - Plastic analysis of indeterminate beams and frames.

TOTAL:45 PERIODS

OUTCOMES:

Students will be able to

- Draw influence lines for statically determinate structures and calculate critical stress resultants.
- Understand Muller Breslau principle and draw the influence lines for statically indeterminate beams.
- Analyse of three hinged, two hinged and fixed arches.
- Analyse the suspension bridges with stiffening girders
- Understand the concept of Plastic analysis and the method of analyzing beams and rigid frames.

TEXTBOOKS:

- Bhavikatti,S.S, Structural Analysis,Vol.1 & 2, Vikas Publishing House Pvt.Ltd., NewDelhi-4, 2014.
- Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, Theory of structures, Laxmi, Publications,2004.
- Vazrani.V.N And Ratwani,M.M, Analysis of Structures, Vol.II, Khanna Publishers,2015.

REFERENCES:

- Negi.L.S and Jangid R.S., Structural Analysis, Tata McGraw-Hill Publishers, 2004.
- Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Co.Ltd.2002.
- Gambhir.M.L., Fundamentals of Structural Mechanics and Analysis, PHIL earning Pvt. Ltd.,2011.
- Prakash Rao D.S., Structural Analysis, Universities Press,1996.

CE8603 IRRIGATION ENGINEERING LTPC
3 0 0 3

OBJECTIVE:

The student is exposed to different phases in irrigation practices and Planning and management of irrigation. Further they will be imparted required knowledge on Irrigation storage and distribution canal system and Irrigation management.

UNIT I CROP WATER REQUIREMENT 9

Need and classification of irrigation- historical development and merits and demerits of irrigation-types of crops-crop season-duty, delta and base period- consumptive use of crops- estimation of Evapotranspiration using experimental and theoretical methods

UNIT II IRRIGATION METHODS 9

Tank irrigation – Well irrigation – Irrigation methods: Surface and Sub-Surface and Micro Irrigation – design of drip and sprinkler irrigation – ridge and furrow irrigation-Irrigation scheduling – Water distribution system- Irrigation efficiencies.

UNIT III DIVERSION AND IMPOUNDING STRUCTURES 9

Types of Impounding structures - Gravity dam – Forces on a dam -Design of Gravity dams; Earth dams, Arch dams- Diversion Head works - Weirs and Barrages-

UNIT IV CANAL IRRIGATION 9

Canal regulations – direct sluice - Canal drop – Cross drainage works-Canal outlets – Design of prismatic canal-canal alignments-Canal lining - Kennedy,s and Lacey,s Regime theory-Design of unlined canal

UNIT V WATER MANAGEMENT IN IRRIGATION 9

Modernization techniques- Rehabilitation – Optimization of water use-Minimizing water losses- On form development works-Participatory irrigation management- Water resources associations-Changing paradigms in water management-Performance evaluation-Economic aspects of irrigation

TOTAL :45 PERIODS

OUTCOMES:

Students will be able to

Have knowledge and skills on crop water requirements.
Understand the methods and management of irrigation.
Gain knowledge on types of Impounding structures
Understand methods of irrigation including canal irrigation.
Get knowledge on water management on optimization of water use.

TEXTBOOKS:

Dilip Kumar Majumdar, “Irrigation Water Management”, Prentice-Hall of India, New Delhi, 2008.

Punmia B.C., et. al; Irrigation and water power Engineering, Laxmi Publications, 16th Edition, New Delhi, 2009

Garg S. K., “Irrigation Engineering and Hydraulic structures”, Khanna Publishers, 23rd Revised Edition, New Delhi, 2009

REFERENCES:

Duggal, K.N. and Soni, J.P., “Elements of Water Resources Engineering”, New Age International Publishers, 2005

Linsley R.K. and Franzini J.B, “Water Resources Engineering”, McGraw-Hill Inc, 2000

Chaturvedi M.C., “Water Resources Systems Planning and Management”, Tata McGraw-Hill Inc., New Delhi, 1997.

Sharma R.K.. "Irrigation Engineering", S.Chand & Co. 2007.
Michael A.M., Irrigation Theory and Practice, 2nd Edition, Vikas Publishing House Pvt. Ltd., Noida, Up, 2008
Asawa, G.L., “Irrigation Engineering”, NewAge International Publishers, New Delhi, 2000.
Basak, N.N, "Irrigation Engineering", Tata McGraw Hill Publishing Co. New Delhi,1999

CE8604 HIGHWAY ENGINEERING LT PC 3003

OBJECTIVE:

To give an overview about the highway engineering with respect to, planning, design, construction and maintenance of highways as per IRC standards, specifications and methods.

UNIT I HIGHWAY PLANNING AND ALIGNMENT 9

Significance of highway planning – Modal limitations towards sustainability - History of road development in India – factors influencing highway alignment – Soil suitability analysis - Road ecology - Engineering surveys for alignment, objectives, conventional and modern methods - Classification of highways – Locations and functions – Typical cross sections of Urban and Rural roads

UNIT II GEOMETRIC DESIGN OF HIGHWAYS 9

Cross sectional elements - Sight distances – Horizontal curves, Super elevation, transition curves, widening at curves – Vertical curves - Gradients, Special consideration for hill roads - Hairpin bends – Lateral and vertical clearance at underpasses.

UNIT III DESIGN OF FLEXIBLE AND RIGID PAVEMENTS 9

Pavement components and their role - Design principles -Design practice for flexible and rigid Pavements (IRC methods only) – Embankments- Problems in Flexible pavement design.

UNIT IV HIGHWAY CONSTRUCTION MATERIALS AND PRACTICE 9

Highway construction materials, properties, testing methods – CBR Test for subgrade - tests on aggregate & bitumen – Test on Bituminous mixes-Construction practice including modern materials and methods, Bituminous and Concrete road construction, Polymer modified bitumen, Recycling, Different materials – Glass, Fiber, Plastic, Geo-Textiles, Geo-Membrane (problem not included) – Quality control measures - Highway drainage –– Construction machineries.

UNIT V EVALUATION AND MAINTENANCE OF PAVEMENTS 9

Pavement distress in flexible and rigid pavements – Types of maintenance – Pavement Management Systems - Pavement evaluation, roughness, present serviceability index, skid resistance, structural evaluation, evaluation by deflection measurements – Strengthening of pavements –Highway Project formulation.

TOTAL: 45 PERIODS

OUTCOMES:

Students will be able to

Get knowledge on planning and aligning of highway.
Geometric design of highways
Design flexible and rigid pavements.
Gain knowledge on Highway construction materials, properties, testing methods
Understand the concept of pavement management system, evaluation of distress and maintenance of pavements.

TEXTBOOKS:

Khanna.S. K., Justo.C.E.G and Veeraragavan A. "Highway Engineering", Nemchand Publishers, 2014.

Subramanian K.P., "Highways, Railways, Airport and Harbour Engineering", Scitech Publications (India), Chennai, 2010

Kadiyali.L.R. "Principles and Practice of Highway Engineering", Khanna Technical Publications, 8th edition Delhi, 2013.

REFERENCES:

Indian Road Congress (IRC), Guidelines for the Design of Flexible Pavements, (Third Revision), IRC: 37-2012

Indian Road Congress (IRC), Guidelines for the Design of Plain Jointed Rigid Pavements for Highways, (Third Revision), IRC: 58-2012

Yang H. Huang, "Pavement Analysis and Design", Pearson Education Inc, Nineth Impression, South Asia, 2012

Ian D. Walsh, "ICE manual of highway design and management", ICE Publishers, Ist Edition, USA, 2011

Fred L. Mannering, Scott S. Washburn and Walter P.Kilareski, "Principles of Highway Engineering and Traffic Analysis", Wiley India Pvt. Ltd., New Delhi, 2011

Garber and Hoel, "Principles of Traffic and Highway Engineering", CENGAGE Learning, New Delhi, 2010

O,Flaherty.C.A "Highways, Butterworth – Heinemann, Oxford, 2006

IRC-37–2012,The Indian roads Congress, Guidelines for the Design of Flexible Pavements, New Delhi

IRC 58-2012. The Indian Road Congress, Guideline for the Design of Rigid Pavements for Highways, New Delhi

EN8592 WASTEWATER ENGINEERING L T P C 3 003

OBJECTIVE:

The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants.

UNIT I PLANNING AND DESIGN OF SEWERAGE SYSTEM 9

Characteristics and composition of sewage - population equivalent -Sanitary sewage flow estimation – Sewer materials – Hydraulics of flow in sanitary sewers – Sewer design – Storm drainage-Storm runoff estimation – sewer appurtenances – corrosion in sewers – prevention and control – sewage pumping-drainage in buildings-plumbing systems for drainage - Rain Water ting.

UNIT II PRIMARY TREATMENT OF SEWAGE 9

Objectives – Unit Operations and Processes – Selection of treatment processes –- Onsite sanitation - Septic tank- Grey water harvesting – Primary treatment – Principles, functions and design of sewage treatment units - screens - grit chamber-primary sedimentation tanks – Construction, Operation and Maintenance aspects.

UNIT III SECONDARY TREATMENT OF SEWAGE 9

Objectives – Selection of Treatment Methods – Principles, Functions, - Activated Sludge Process and Extended aeration systems -Trickling filters– Sequencing Batch Reactor(SBR) – Membrane Bioreactor - UASB – Waste Stabilization Ponds – - Other treatment methods -Reclamation and Reuse of sewage - Recent Advances in Sewage Treatment – Construction, Operation and Maintenance aspects.

UNIT IV DISPOSAL OF SEWAGE 9

Standards for– Disposal - Methods – dilution – Mass balance principle - Self purification of river- Oxygen sag curve – deoxygenation and reaeration - Streeter–Phelps model - Land disposal – Sewage farming – sodium hazards - Soil dispersion system.

UNIT V SLUDGE TREATMENT AND DISPOSAL 9

Objectives - Sludge characterization – Thickening - Design of gravity thickener- Sludge digestion – Standard rate and High rate digester design- Biogas recovery – Sludge Conditioning and Dewatering – Sludge drying beds- ultimate residue disposal – recent advances.

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will have

- An ability to estimate sewage generation and design sewer system including sewage pumping stations
- The required understanding on the characteristics and composition of sewage, self-purification of streams
- An ability to perform basic design of the unit operations and processes that are used in sewage treatment
- Understand the standard methods for disposal of sewage.
- Gain knowledge on sludge treatment and disposal.

TEXTBOOKS:

- Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers,New Delhi, 2015.
- Duggal K.N., “Elements of Environmental Engineering” S.Chand and Co. Ltd., New Delhi, 2014.
- 3, Punmia, B.C., Jain, A.K., and Jain.A.K.., Environmental Engineering, Vol.II, Laxmi Publications, 2010.

REFERENCES:

- Manual on Sewerage and Sewage Treatment Systems Part A,B and C, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013.
- Metcalf and Eddy- Wastewater Engineering–Treatment and Reuse, Tata Mc.Graw-Hill Company, New Delhi, 2010.
- Syed R. Qasim “Wastewater Treatment Plants”, CRC Press, Washington D.C.,2010
- Gray N.F, “Water Technology”, Elsevier India Pvt. Ltd., New Delhi, 2006.

CE8611 HIGHWAY ENGINEERING LABORATORY LTPC 0042

OBJECTIVE :

To learn the principles and procedures of testing of highway materials

EXCERCISES :

I TEST ON AGGREGATES

Specific Gravity
Los Angeles Abrasion Test
Water Absorption of Aggregates

TEST ON BITUMEN

Specific Gravity of Bitumen
Penetration Test
Viscosity Test
Softening Point Test
Ductility Test

TESTS ON BITUMINOUS MIXES

Stripping Test
Determination of Binder Content
Marshall Stability and Flow Values

IV DEMONSTRATION OF ANY ONE FIELD TESTING EQUIPMENT LIKE SKID RESISTANCE TESTER/ BENKELMAN BEAM ETC

TOTAL: 60 PERIODS

OUTCOME:

Student knows the techniques to characterize various pavement materials through relevant tests.

REFERENCES:

Highway Materials and Pavement Testing, Nem Chand and Bros., Roorkee, Revised Fifth Edition, 2009

Methods for testing tar and bituminous materials, IS 1201–1978 to IS 1220– 1978, Bureau of Indian Standards

Methods of test for aggregates, IS 2386 – 1978, Bureau of Indian Standards

Mix Design Methods Asphalt Institute Manual Series No. 2, Sixth Edition,1997, Lexington, KY, USA.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

Sl.No	Description of Equipment	Quantity
1.	Concrete cube moulds	6
2.	Concrete cylinder moulds	3
3.	Concrete Prism moulds	3
4.	Sieves	1set
5.	Concrete Mixer	1
6.	Slump cone	3
7.	Flow table	1
8.	Vibrator	1
9.	Trovels and planers	1 set
10.	UTM – 400 kN capacity	1
11.	Vee Bee Consistometer	1
12.	Aggregate impact testing machine	1
13.	CBR Apparatus	1
14.	Blains Apparatus	1
15.	Los - Angeles abrasion testing machine	1
16.	Marshall Stability Apparatus	1

CE8612 IRRIGATION AND ENVIRONMENTAL ENGINEERING DRAWING **L T P C**
0 0 4 2

OBJECTIVE:

At the end of the semester, the student shall conceive, design and draw the irrigation and environmental engineering structures in detail showing the plan, elevation and Sections.

PART A: IRRIGATION ENGINEERING

1. TANK COMPONENTS **9**

Fundamentals of design - Tank surplus weir – Tank sluice with tower head - Drawings showing foundation details, plan and elevation

2. IMPOUNDING STRUCTURES **6**

Design principles - Earth dam – Profile of Gravity Dam

3. CROSS DRAINAGE WORKS **6**

General design principles - Aqueducts – Syphon aqueduct (Type III) – Canal drop (Notch Type) – Drawing showing plan, elevation and foundation details.

4. CANAL REGULATION STRUCTURES **9**

General Principles - Direct Sluice - Canal regulator - Drawing showing detailed plan, elevation and foundation details.

PART B: ENVIRONMENTAL ENGINEERING

1. WATER SUPPLY AND TREATMENT **15**

Design and Drawing of flash mixer, flocculator, clarifier – Rapid sand filter – Service reservoirs – Pumping station – House service connection for water supply and drainage.

4. SEWAGE TREATMENT & DISPOSAL **15**

Design and Drawing of screen chamber - Grit channel - Primary clarifier - Activated sludge process – Aeration tank – Trickling filter – Sludge digester – Sludge drying beds – Septic tanks and disposal arrangements.

TOTAL: 60 PERIODS

OUTCOME:

The students after completing this course will be able to design and draw various units of Municipal water treatment plants and sewage treatment plants.

TEXTBOOKS:

Satya Narayana Murthy Challa, “Water Resources Engineering: Principles and Practice”, New Age International Publishers, New Delhi, 2002.

Garg, S.K., “Irrigation Engineering and Design of Structures”, New Age International Publishers, New Delhi, 1997.

Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999.

Manual on “Sewerage and Sewage Treatment Systems- Part A, B and C” CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013.

REFERENCES:

Mohanakrishnan. A, “A few Novel and Interesting Innovative Irrigation Structures: Conceived, Designed and Executed in the Plan Projects in Tamil Nadu”, Publ. No. 44 and Water Resources Development & Management Publ.No.43, IMTI Thuvakudy, Trichy, 2011.

Raghunath, H.M. “Irrigation Engineering”, Wiley India Pvt. Ltd., New Delhi, 2011.

Sharma R.K.,“Irrigation Engineering and Hydraulic Structures”, Oxford and IBH Publishing Co., New Delhi, 2002.

Peary, H.S., ROWE, D.R., Tchobanoglous, G., “Environmental Engineering”, McGraw-HillBook Co., New Delhi, 1995.

Metcalf and Eddy, “Wastewater Engineering, Treatment and Reuse”, Tata McGraw-Hill,New Delhi, 2010.

Qasim,S.R., Motley, E.M and Zhu.G. "Water works Engineering – Planning, Design and Operation", Prentice Hall, New Delhi, 2009.

Qasim, S. R. "Wastewater Treatment Plants, Planning, Design & Operation", CRC Press,New York, 2010

HS8581 PROFESSIONAL COMMUNICATION L T P C 0021

OBJECTIVES: The couse aims to:

Enhance the Employability and Career Skills of students
Orient the students towards grooming as a professional
Make them Employable Graduates
Develop their confidence and help them attend interviews successfully.

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes

TOTAL :30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:

Make effective presentations
Participate confidently in Group Discussions.
Attend job interviews and be successful in them.
Develop adequate Soft Skills required for the workplace

Recommended Software

Open Source Software
Win English

REFERENCES:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015
Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.
E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014
S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

CE8701 ESTIMATION, COSTING AND VALUATION ENGINEERING LTPC
3 003

OBJECTIVE:

The students will acquire knowledge in estimation, tender practices, contract procedures, and valuation and will be able to prepare estimates, call for tenders and execute works.

UNIT I QUANTITY ESTIMATION 9

Philosophy – Purpose – Methods of estimation – Types of estimates – Approximate estimates – Detailed estimate – Estimation of quantities for buildings, bituminous and cement concrete roads, septic tank, soak pit, retaining walls – culverts (additional practice in class room using computer softwares)

UNIT II RATE ANALYSIS AND COSTING 9

Standard Data – Observed Data – Schedule of rates – Market rates – Standard Data for Man Hours and Machineries for common civil works – Rate Analysis for all Building works, canals, and Roads– Cost Estimates (additional practice in class room using Computer softwares) -
(Analysis of rates for the item of work asked, the data regarding labour, rates of material and rates of labour to be given in the Examination Question Paper)

UNIT III SPECIFICATIONS, REPORTS AND TENDERS 9

Specifications – Detailed and general specifications – Constructions – Sources – Types of specifications – Principles for report preparation – report on estimate of residential building – Culvert – Roads – TTT Act 2000 – Tender notices – types – tender procedures – Drafting model tenders , E-tendering-Digital signature certificates- Encrypting -Decrypting – Reverse auctions.

UNIT IV CONTRACTS 9

Contract – Types of contracts – Formation of contract – Contract conditions – Contract for labour, material, design, construction – Drafting of contract documents based on IBRD / MORTH Standard bidding documents – Construction contracts – Contract problems – Arbitration and legal requirements.

UNIT V VALUATION 9

Definitions – Various types of valuations – Valuation methods - Necessity – Capitalised value – Depreciation – Escalation – Valuation of land – Buildings – Calculation of Standard rent – Mortgage – Lease

TOTAL: 45 PERIODS

OUTCOMES:

The student will be able to

Estimate the quantities for buildings,
Rate Analysis for all Building works, canals, and Roads and Cost Estimate.
Understand types of specifications, principles for report preparation, tender notices types.
Gain knowledge on types of contracts
Evaluate valuation for building and land.

TEXTBOOKS:

B.N Dutta ˆEstimating and Costing in Civil Engineering,, UBS Publishers & Distributors (P) Ltd, 2010.
B.S.Patil, ˆCivil Engineering Contracts and Estimates,, University Press, 2006
D.N. Banerjee, ˆPrinciples and Practices of Valuation,, V Edition, Eastern Law House, 1998

REFERENCES:

Hand Book of Consolidated Data – 8/2000, Vol.1, TNPWD
Tamil Nadu Transparencies in Tenders Act, 1998
Arbitration and Conciliation Act, 1996

Standard Bid Evaluation Form, Procurement of Good or Works, The World Bank, April 1996
Standard Data Book for Analysis and Rates, IRC, New Delhi, 2003

CE8702 RAILWAYS, AIRPORTS, DOCKS AND HARBOUR ENGINEERING LTPC
3 003

OBJECTIVE:

To introduce the students about Railways planning, design, construction and maintenance and planning design principles of airport and harbour

UNIT I RAILWAY PLANNING AND CONSTRUCTION 10

Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges - Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods--Geometric design of railway, gradient, super elevation, widening of gauge on curves- Level Crossings. .

UNIT II RAILWAY CONSTRUCTION AND MAINTENANCE 8

Earthwork – Stabilization of track on poor soil - Track drainage – Calculation of Materials required for track laying - Construction and maintenance of tracks – Railway Station and yards and passenger amenities-Signalling

UNIT III AIRPORT PLANNING 7

Air transport characteristics - airport classification – ICAO - airport planning: Site selection typical Airport Layouts, Case Studies, parking and Circulation Area

UNIT IV AIRPORT DESIGN 10

Runway Design: Orientation, Wind Rose Diagram, Problems on basic and Actual Length, Geometric Design – Elements of Taxiway Design – Airport Zones – Passenger Facilities and Services – Runway and Taxiway Markings.

UNIT V HARBOUR ENGINEERING 10

Definition of Basic Terms: Harbour, Port, Satellite Port, Docks, Waves and Tides – Planning and Design of Harbours: Harbour Layout and Terminal Facilities – Coastal Structures: Piers, Break waters, Wharves, Jetties, Quays, Spring Fenders, Dolphins and Floating Landing Stage – Inland Water Transport – Wave action on Coastal Structures and Coastal Protection Works – Coastal Regulation Zone, 2011

TOTAL: 45 PERIODS

OUTCOMES:

Students who successfully complete this course will be able to:

Understand the methods of route alignment and design elements in Railway Planning and Constructions.

Understand the Construction techniques and Maintenance of Track laying and Railway stations.

Gain an insight on the planning and site selection of Airport Planning and design.

Analyze and design the elements for orientation of runways and passenger facility systems.

Understand the various features in Harbours and Ports, their construction, coastal protection works and coastal Regulations to be adopted.

TEXTBOOKS:

Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, V Scitech Publications (India), Chennai, 2010

Saxena Subhash, C.and Satyapal Arora, A Course in Railway Engineering, Dhanapat Rai and Sons, Delhi, 1998

Khanna.S.K. Arora.M.G and Jain.S.S, Airport Planning and Design, Nemachand and Bros, Roorkee, 1994

REFERENCES:

Venkatramaiah. C., Transportation Engineering-Vol.2 Railways, Airports, Docks and Harbours, Bridges and Tunnels.,Universities Press (India) Private Limited, Hyderabad, 2015.

Mundrey J S, Railway Track Engineering, McGraw Hill Education (India) Private Ltd, New Delhi, 2013

CE8703 STRUCTURAL DESIGN AND DRAWING LT PC 3024

OBJECTIVE:

This course aims at providing students with a solid background on the principles of structural engineering design. Students will be acquire the knowledge of liquid retaining structures, bridges components, retaining wall and industrial structures.

UNIT I RETAINING WALLS 9+6

Reinforced concrete Cantilever and Counter fort Retaining Walls–Horizontal Backfill with Surcharge–Design of Shear Key-Design and Drawing.

UNIT II FLAT SLAB and BRIDGES 9+6

Design of Flat Slabs with and without drops by Direct Design Method of IS code- Design and Drawing - IRC Specifications and Loading – RC Solid Slab Bridge – Steel Foot-over Bridge-Design and Drawing.

UNIT III LIQUID STORAGE STRUCTURES 9+6

RCC Water Tanks - On ground, Elevated Circular, underground Rectangular Tanks–Hemispherical Bottomed Steel Water Tank –-Design and Drawing

UNIT IV INDUSTRIAL STRUCTURES 9+6

Structural steel Framing - Steel Roof Trusses – Roofing Elements – Beam columns – Codal provisions - Design and Drawing.

UNIT V GIRDERS AND CONNECTIONS 9+6

Plate Girders – Behaviour of Components-Deign of Welded Plate Girder-Design of Industrial Gantry Girders – Design of Eccentric Shear and Moment Resisting connections.

TOTAL: 75 PERIODS

Design and Drawing Exercises for practical

component Part A - RCC Structures

Rectangular Column and Footing
Combined footing with Two columns
RCC one way &Two way Slab and beam system

Cantilever Retaining wall
RCC T beam bridge deck
Underground Rectangular Water Tank
Elevated circular water Tank

Part B- Steel Structures

Built up column, column base and Foundation
Simple Steel Roof Trusses
Industrial building Elements
Plate Girder (welded)
Framed Connections and Detailing
Gantry girder
Steel water Tank

STRUCTURAL DESIGN AND DRAWING	Theory Examination		Practicals	
	Question paper Pattern	**Marks to awarded**	**Question paper Pattern**	**Marks to awarded**
This paper is a theory cum practical course weightage for theory 80% and for practical 20%	Five Either/Or type questions 5 x20 = 100 marks : covering all the five units Total Duration of Examination will be 3 hours Each Question include Design - 12 Marks Free hand Drawing (Not to scale) - 8 marks	Theoretical component Marks will carry 80% weightage. End Semester Examination will be conducted by COE	2 Questions, one from Part A - RCC Structures & one from Part B- Steel Structures	Practical component Marks will carry 20% weightage. Practical Examination will be conducted by the respective institution as internal mode.

OUTCOMES:

At the end of the course the student will be able to

Design and draw reinforced concrete Cantilever and Counterfort Retaining Walls
Design and draw flat slab as per code provisions
Design and draw reinforced concrete and steel bridges
Design and draw reinforced concrete and steel water tanks
Design and detail the various steel trusses and cantry girders

TEXTBOOKS:

Krishnaraju N, Structural Design and Drawing, Universities Press, 2009.
Punmia B.C,Ashok Kumar Jain and Arun KumarJain,Comprehensive Design of Steel Structures, Laxmi Publications Pvt. Ltd., 2003.

REFERENCES:

Krishnamurthy D,Structural Design and Drawing VolI,IIandIII,CBS Publishers, 2010.
Shah V L and Veena Gore,Limit State Design of Steel Structures
IS800-2007,Structures Publications, 2009.
IS 456(2000) Indian Standard Plain and Reinforced Concrete-Code of Practice, Bureau of Indian Standards, New Delhi.

SP34 Handbook on Concrete Reinforcement and Detailing, Bureau of Indian Standards, New Delhi.
IS 800 (2007) Indian Standard General Construction In Steel—Code of Practice, Bureau of Indian Standards, New Delhi.
IS 875 Part 1 (2003) Code of Practice for Design Loads (Other Than Earthquake) for Buildings and Structures, Code of Practice-Dead Load, Bureau of Indian Standards, New Delhi.
IS 875 Part 2 (2003) Code of Practice for Design Loads (Other Than Earthquake) for Buildings and Structures, Code of Practice-Imposed Load, Bureau of Indian Standards, New Delhi.
IS 875 Part 3 (2003) Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Code of Practice-Wind Load, Bureau of Indian Standards, New Delhi.
IS 3370 Part 1 (2009) Indian Standard Concrete Structures for Storage of Liquids-Code of Practice–General Requirements, Code of Practice, Bureau of Indian Standards, New Delhi.
IS 3370 Part 2 (2009) Indian Standard Concrete Structures for Storage of Liquids-Code of Practice-Reinforced Concrete Structures, Code of Practice, Bureau of Indian Standards, New Delhi.
IS 3370–Part 4 (2008) Indian Standard Code of Practice for Concrete Structures for The Storage of Liquids-Design Tables, Code of Practice, Bureau of Indian Standards, New Delhi.
IS 804 (2008) Indian Standard Specification for Rectangular Pressed Steel Tanks, Code of Practice, Bureau of Indian Standards, New Delhi.
IS 805 (2006) Indian Standard Code of Practice for Use of Steel in Gravity Water Tanks, Code of Practice, Bureau of Indian Standards, New Delhi.
IRC 112-2011, Code of Practice for Concrete Road Bridges, The Indian Roads Congress, New Delhi.
IRC 6-2014, Standard Specifications and Code of Practice for Road Bridges Section: II-Loads and Stresses, The Indian Roads Congress, New Delhi.

CE8711	CREATIVE AND INNOVATIVE PROJECT (Activity Based - Subject Related)	LTPC 004 2

OBJECTIVE:

To use the knowledge acquired in Civil Engineering to do a mini project, which allows the students to come up with designs, fabrication or algorithms and programs expressing their ideas in a novel way.

TOTAL: 60 PERIODS

STRATEGY

To identify a topic of interest in consultation with Faculty/Supervisor. Review the literature and gather information pertaining to the chosen topic. State the objectives and develop a methodology to achieve the objectives. Carryout the design / fabrication or develop computer code. Demonstrate the novelty of the project through the results and outputs.

CE8712	INDUSTRIAL TRAINING (4 Weeks During VI Semester – Summer)	LT PC 0002

OBJECTIVE:

To train the students in field work so as to have a firsthand knowledge of practical problems in carrying out engineering tasks. To develop skills in facing and solving the field problems.

STRATEGY:
The students individually undertake training in reputed civil engineering companies for the specified duration. At the end of the training, a report on the work done will be prepared and presented. The students will be evaluated through a viva-voce examination by a team of internal staff.

OUTCOMES:
At the end of the course the student will be able to understand
The intricacies of implementation textbook knowledge into practice
The concepts of developments and implementation of new techniques

CE8811	PROJECT WORK	L T P C
		0 020 10

OBJECTIVE:
To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

STRATEGY:
The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

TOTAL: 300 PERIODS

OUTCOME:
On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

GI8012	DIGITAL CADASTRE	L T P C
		3003

OBJECTIVE:
To introduce the students to the cadastral survey Methods and its applications in generation of Land information system.

UNIT I INTRODUCTION **9**
History of cadastral survey - Types of survey - Tax - Real Property – Legal cadastre -Graphical and Numerical Cadastre, Legal Characteristics of Records, Torrens System.

UNIT II CADASTRAL SURVEY METHODS **9**
Steps in survey of a village - Instruments used for cadastral survey & mapping - Orthogonal, Polar survey methods - Boundary survey - Rectangulation - Calculation of area of Land- GPS and Total Station in Cadastral survey.

UNIT III PHOTOGRAMMETRIC METHODS **9**
Photogrammetry for cadastral surveying and mapping - Orthophoto map – Quality control measures - Organisation of cadastral offices – international scenario.

UNIT IV CADASTRAL MAPPING AND LIS **9**

Cadastral map reproduction - Map projection for cadastral maps – Conventional symbols - map - reproduction processes - Automated cadastral map, Management of Digital Cadastral. Creation of Land Information System. Integrating LIS –Land administration.

UNIT V MAINTENANCE AND MEASUREMENTS **9**

Cadastral survey maintenance - Resurveys - Measurement of sub-division - Measurement of obstructed lines - Survey of urban areas - Control requirement for Urban survey use of Satellite Imagery in boundary fixing.

TOTAL: 45 PERIODS

OUTCOMES:

On completion of this course students will be able to

Gain knowledge about cadastre survey.

Understand the methods of cadastral survey.

Get the knowledge about photogrammetric methods.

Understand Land Record System and computational procedure for modernization of the same.

The students will be in position to understand the Government procedure in Land Record Management.

TEXTBOOKS:

Paul. R Wolf., Bon A. DeWitt, Elements of Photogrammetry with Application in GIS McGraw Hill International Book Co., 4th Edition, 2014

R.Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.

REFERENCES:

Karl Kraus, Photogrammetry: Geometry from Images and Laser Scans, Walter de Gruyter GmbH & Co. 2nd Edition, 2007.

E. M. Mikhail, J. S. Bethel, J. C. McGlone, Introduction to Modern Photogrammetry, Wiley Publisher, 2001.

James, M. Anderson and Edward N. Mikhail, Introduction to Surveying, McGraw Hill Book Co, 1985.

GI8013 ADVANCED SURVEYING LTPC 3003

OBJECTIVE :

To understand the use of Astronomy, Photogrammetry, Total Station and GPS

UNIT I ASTRONOMICAL SURVEYING **9**

Astronomical terms and definition – Motion of sun and stars – Celestial co-ordinate System - Time system - Nautical Alamance – Apparent attitude and corrections – Field observations and determinations of time, longitude, latitude and azimuth by attitude and Hour angle method.

UNIT II AERIAL SURVEYING **9**

Terrestrial Photogrammetry – Terrestrial stereo photogrammetry – Aerial photogrammetry – overlaps – scale of photographs – Vertical and titled photographs distortion in aerial photographs – stereostopic vision - photo interpretation – Applications.

UNIT III TOTAL STATION SURVEYING 9

Classification – basic measuring and working principles of an Electro – optical and Microwave total station- sources of errors in Electro – optical and Microwave total station – Care and Maintenance of total station – trilateration – Applications.

UNIT IV GPS SURVEYING 9

Basic concepts – Space, Control and User segments – Satellite configuration – Signal structure – Orbit determination and representation – Antispoofing and selective availability – hand held and geodetic receivers – Field work procedure – Data processing Applications.

UNIT V MISCELLANEOUS 9

Reconnaissance – Rout surveys for highways, railways and waterways – simple, compound, reverse , transition and vertical curve – setting out methods - hydrographic surveying – tides – MSL – Sounding methods – measurement of current and discharge – Tunnel alignment and setting out – Settlement and Deformation studies.

TOTAL: 45 PERIODS

OUTCOMES:

On completion of this course, the student shall be able to

know the astronomical surveying
do the photogrammetric surveying and interpretation
solve the field problems with Total station
know the GPS surveying and the data processing
understand the route surveys and tunnel alignments

TEXT BOOKS:

James M.Anderson and Edward M.Mikhail, " Surveying, Theory and Practice", 7th Edition, McGraw Hill, 2001.
Bannister and S.Raymond, "Surveying", 7th Edition, Longman 2004.
Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.

REFERENCES:

Roy S.K., "Fundamentals of Surveying", 2nd Edition, Prentice Hall of India, 2004.
Arora K.R. "Surveying Vol I & II", Standard Book House, 10th Edition 2008.
Guocheng Xu, GPS Theory, Algorithms and Applications, Springer – Verlag, Berlin, 2003.
Seeber G, Satellite Geodesy, Water De Gruyter, Berlin,1998.

GI8014 GEOGRAPHIC INFORMATION SYSTEM L T P C
3003

OBJECTIVES :

- To introduce the fundamentals and components of Geographic Information System

To provide details of spatial data structures and input, management and output processes.

UNIT I FUNDAMENTALS OF GIS 9

Introduction to GIS - Basic spatial concepts - Coordinate Systems - GIS and Information Systems – Definitions – History of GIS - Components of a GIS – Hardware, Software, Data, People, Methods – Proprietary and open source Software - Types of data – Spatial, Attribute data- types of attributes – scales/ levels of measurements.

UNIT II SPATIAL DATA MODELS 9

Database Structures – Relational, Object Oriented – Entities – ER diagram - data models - conceptual, logical and physical models - spatial data models – Raster Data Structures – Raster Data Compression - Vector Data Structures - Raster vs Vector Models- TIN and GRID data models.

UNIT III DATA INPUT AND TOPOLOGY 9

Scanner - Raster Data Input – Raster Data File Formats – Georeferencing – Vector Data Input –Digitiser – Datum Projection and reprojection -Coordinate Transformation – Topology - Adjacency, connectivity and containment – Topological Consistency – Non topological file formats - Attribute Data linking – Linking External Databases – GPS Data Integration

UNIT IV DATA QUALITY AND STANDARDS 9

Data quality - Basic aspects - completeness, logical consistency, positional accuracy, temporal accuracy, thematic accuracy and lineage – Metadata – GIS Standards –Interoperability - OGC - Spatial Data Infrastructure

UNIT V DATA MANAGEMENT AND OUTPUT 9

Import/Export – Data Management functions- Raster to Vector and Vector to Raster Conversion - Data Output - Map Compilation – Chart/Graphs – Multimedia – Enterprise Vs. Desktop GIS-distributed GIS.

TOTAL: 45 PERIODS

OUTCOMES:

This course equips the student to

Have basic idea about the fundamentals of GIS.
Understand the types of data models.
Get knowledge about data input and topology.
Gain knowledge on data quality and standards.
Understand data management functions and data output

TEXT BOOKS:

Kang - Tsung Chang, Introduction to Geographic Information Systems, McGraw Hill Publishing, 2nd Edition, 2011.

Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasa Raju, “An Introduction Geographical Information Systems, Pearson Education, 2nd Edition,2007.

REFERENCE:

Lo.C.P., Albert K.W. Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall India Publishers, 2006

GI8015 GEOINFORMATICS APPLICATIONS FOR CIVIL ENGINEERS LTPC
3 003

OBJECTIVE:

To solve the Civil Engineering problems with the help of Geoinformatics technique.

UNIT I LAND RESOURCE MANAGEMENT 6

Total Station and GPS Surveys – Topographic and Bathymetric Surveys – Cadastral Information – Soil and Land Use Surveys - Land Information System (LIS) – Real Estate Information System

UNIT II STRUCTURAL STUDIES 6

Deformation studies of deflection - Dam deformation - structural movement - Pavement yield - shifting sand-bank and shoreline – Landslide Risk Analysis

UNIT III SOIL CONSERVATION AND MANAGEMENT 9

Soil survey interpretation and mapping - impact of agricultural and industrial activity on soil properties - soil erosion - factors influencing soil erosion - soil contamination using Hyper spectral Remote Sensing - mining pollution- EMR responses with contaminated soil - modeling soil characteristics using satellite data - soil degradation assessment using Remote Sensing and GIS - Land reclamation studies

UNIT IV URBAN AND TRANSPORTATION MANAGEMENT 12

Monitoring Urban Growth through Remote Sensing - Geo-demographic Analysis – Property Market Analysis Urban Renewal - traffic analysis - accident analysis - site suitability analysis for transport infrastructure –transportation databases: creation and maintenance - Vehicle routing – Highway maintenance system – Intelligent Transportation System

UNIT V WATER RESOURCES PLANNING AND MANAGEMENT 12

Location of storage/diversion works – capacity curve generation – sediment yield - modelling of catchments – Delineation of watershed - Watershed modelling for sustainable development - Rainfall – Runoff modelling –LiDAR Mapping for Urban area –Water quality mapping and monitoring – Flood Risk Zoning - Flood damage assessment – Flood Modelling - Assessment of droughts and mitigation

TOTAL: 45 PERIODS

OUTCOMES:

On completion of this course students will be able to

Get knowledge about the land resource management.
Study structural deformation and movement.
Model soil characteristics, soil degradation assessment and management.
Monitor urban growth and management of transport infrastructure.
Model catchments and management of water resources.

TEXTBOOKS:

Basudeb Bhatta, ˆRemote Sensing and GIS,, Second edition, Oxford University Press 2011.
Lo.C.P., Albert K.W.Yeung, Concepts and Techniques of Geographic Information Systems, Second edition, PHI Learning Private Limited, Delhi, 2014.

REFERENCES:

Andrew N. Rencz, Manual of Remote Sensing: Remote Sensing for Natural Resource Management and Environmental Monitoring, John Wiley & Sons Inc, April 2004
Rashed, Tarek; Jürgens, Carsten (Eds.), Remote Sensing of Urban and Suburban Areas, Springer, 1st Edition. 2010.
Harvey J. Miller, Shih-Lung Shaw, Geographic Information Systems for Transportation – Principles and Applications, Oxford University Press, 2001.
Gert A. Schulitz Edwin T. Engman, Remote Sensing in hydrology and Water Management, Springer - verlag Berlin Heidelberg Germany - 2000.

GI8491 TOTAL STATION AND GPS SURVEYING LTPC
3 003

OBJECTIVE :

To understand the working of Total Station equipment and solve the surveying problems.

UNIT I FUNDAMENTALS OF TOTAL STATION AND ELECTROMAGNETIC WAVES 9

Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies- Refractive index (RI) - factors affecting RI-Computation of group for light and near infrared waves at standard and ambient conditions-Computation of RI for microwaves at ambient condition - Reference refractive index- Real time application of first velocity correction. Measurement of atmospheric parameters- Mean refractive index- Second velocity correction - Total atmospheric correction- Use of temperature - pressure transducers.

UNIT II ELECTRO-OPTICAL AND MICROWAVE SYSTEM 9

Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments – Traversing and Trilateration-COGO functions, offsets and stake out-land survey applications.

UNIT III SATELLITE SYSTEM 9

Basic concepts of GPS - Historical perspective and development - applications - Geoid and Ellipsoid- satellite orbital motion - Keplerian motion – Kepler^s Law - Perturbing forces - Geodetic satellite - Doppler effect - Positioning concept –GNSS, IRNSS and GAGAN - Different segments - space, control and user segments - satellite configuration – GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - GPS receivers.

UNIT IV GPS DATA PROCESSING 9

GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data RINEX Format – Differential data processing – software modules -solutions of cycle slips, ambiguities, Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods -satellite geometry accuracy measures - applications- long baseline processing- use of different softwares available in the market.

UNIT V HYDROGRAPHIC, MINE AND CADASTRAL SURVEYING 9

Reconnaissance – Route surveys for highways, railways and waterways – Hydrographic survey- Tides – MSL – Sounding methods – Three point problem – River surveys – Measurement of current and discharge – Mine surveying Equipment – Weisbach triangle – Tunnel alignment and setting out – Transfer of azimuth – Gyro Theodolite – Shafts and audits - Cadastral survey- Legal – Real – Taxcadastre – Land record system – Settlement procedure – deformation studies.

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course the student will be able to understand

Working principles of total station and GPS instruments
Propagation of EMR through atmosphere and corrections for its effects
The functioning various types total station and GPS equipments and their applications
Various techniques available for surveying and mapping with total station and GPS.

TEXTBOOKS:

Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1996
Satheesh Gopi, rasathishkumar, N.madhu, — Advanced Surveying , Total Station GPS and Remote Sensing — Pearson education , 2007 isbn: 978-81317 00679

REFERENCES :

R.Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.
Guocheng Xu, GPS Theory, Algorithms and Applications, Springer - Verlag, Berlin, 2003.
Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 1998

GE8071 DISASTER MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

To provide students an exposure to disasters, their significance and types.
To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
To enhance awareness of institutional processes in the country and
To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don,ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9 Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

Differentiate the types of disasters, causes and their impact on environment and society

Assess vulnerability and various methods of risk reduction measures as well as mitigation.

Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

TEXTBOOKS:

Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423

Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13**:** 978-1259007361]

Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011

Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES:

Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005

Government of India, National Disaster Management Policy,2009.

GE8074 HUMAN RIGHTS LT PC 3003

OBJECTIVE:

To sensitize the Engineering students to various aspects of Human Rights.

UNIT I 9

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II 9

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III 9

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV 9

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO,s, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

OUTCOME :

Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.

Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.

Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi

CE8001 GROUND IMPROVEMENT TECHNIQUES LTPC
3 003

OBJECTIVE:

Students will be exposed to various problems associated with soil deposits and methods to evaluate them. The different techniques will be taught to them to improve the characteristics of difficult soils as well as design techniques required to implement various ground improvement methods.

UNIT I PROBLEMATIC SOIL AND IMPROVEMENT TECHNIQUES 8

Role of ground improvement in foundation engineering – Methods of ground improvement – Geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions.

UNIT II DEWATERING 10

Dewatering Techniques - Well points – Vacuum and electroosmotic methods – Seepage analysis for two dimensional flow for fully and partially penetrated slots in homogeneous deposits – Design for simple cases.

UNIT III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS 10

Insitu densification of cohesionless soils – Shallow as deep compaction – Dynamic compaction - Vibroflotation, Sand compaction piles and deep compaction. Consolidation of cohesionless soils - Preloading with sand drains, and fabric drains, Stabilization of soft clay ground using stone columns and Lime piles-Installation techniques – Simple design - Relative merits of above methods and their limitations.

UNIT IV EARTH REINFORCEMENT 9

Concept of reinforcement – Types of reinforcement material – Reinforced earth wall – Mechanism – Simple design - Applications of reinforced earth; Functions of Geotextiles in filtration, drainage, separation, road works and containment applications.

UNIT V GROUTING TECHNIQUES 8

Types of grouts – Grouting equipments and machinery – Injection methods – Grout monitoring – Stabilization with cement, lime and chemicals – Stabilization of expansive soil.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the student will be able to

Gain knowledge on methods and selection of ground improvement techniques.
Understand dewatering techniques and design for simple cases.
Get knowledge on insitu treatment of cohesionless and cohesive soils.
Understand the concept of earth renforcement and design of reinforced earth.
Get to know types of grouts and grouting technique.

TEXTBOOKS:

Purushothama Raj. P, "Ground Improvement Techniques", Lakshmi Publications, 2nd Edition, 2016.
Koerner, R.M. "Construction and Geotechnical Methods in Foundation Engineering", McGraw Hill, 1994.
Nihar Ranjan Patra, "Ground Improvement Techniques", Vikas Publishing House, First Edition, 2012.
Mittal.S, "An Introduction to Ground Improvement Engineering", Medtech Publisher, First Edition, 2013.

REFERENCES:

Moseley, M.P., "Ground Improvement" Blockie Academic and Professional, 1992.
Moseley, M.P and Kirsch. K., ˆGround Improvement", Spon Press, Taylor and Francis Group, London, 2nd Edition, 2004.
Jones C.J.F.P. "Earth Reinforcement and Soil Structure", Thomas Telford Publishing, 1996.
Winterkorn, H.F. and Fang, H.Y. "Foundation Engineering Hand Book". Van Nostrand Reinhold, 1994.
Das, B.M., "Principles of Foundation Engineering" (seventh edition), Cengage learning, 2010.
Coduto, D.P., "Geotechnical Engineering – Principles and Practices", Prentice Hall of India Pvt.Ltd. New Delhi, 2011.
Koerner, R.M., "Designing with Geosynthetics" (Sixth Edition), Xlibris Corporation, U.S.A, 2012.
IS Code 9759 : 1981 (Reaffirmed 1998) "Guidelines for Dewatering During Construction", Bureau of Indian Standards, New Delhi.
IS Code 15284 (Part 1): 2003 "Design and Construction for Ground Improvement – Guidelines" (Stone Column), Bureau of Indian Standards, New Delhi.

CE8002 INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS L T P C
3 0 0 3

OBJECTIVE:

To understand the basics of soil dynamics – dynamic behaviour of soils – effects of dynamic loads and the various design methods.

UNIT I THEORY OF VIBRATION 9

Introduction – Nature dynamic loads – Vibrations of single degree freedom system – Free vibrations of spring – mass systems – Forced vibrations – Viscous damping - Transmissibility – Principles of vibration measuring instruments – Effect of Transient and Pulsating loads.

UNIT II WAVE PROPAGATION 9

Elastic waves in rods of infinite length – Longitudinal and Torsional – Effect of end conditions – Longitudinal and torsional vibrations of rods of finite length – Wave Propagation in infinite, homogeneous isotropic and elastic medium - Wave propagation in elastic half space – Typical values of compres wave and shear wave velocity – Wave propagation due to Machine foundation – Surface wave – Typical values – Particle movements and velocity.

UNIT III DYNAMIC PROPERTIES OF SOILS 9

Dynamic stress – Strain characteristics – Principles of measuring dynamic properties – Laboratory Techniques – Field tests – Factors affecting dynamic properties – Typical values – Dynamic bearing capacity – Dynamic earth pressure.

UNIT IV FOUNDATION FOR DIFFERENT TYPES OF MACHINES 9

Types of machines and foundation – General requirements – Modes of vibration of a rigid foundation – Method of analysis – Linear elastic weightless spring method – Elastic half space method – Analog Method – Design of block foundation – Special consideration for rotary, Impact type of machines – Codal Provisions.

UNIT V INFLUENCE OF VIBRATION AND REMEDIATION 9

Mechanism of Liquefaction – Influencing factors – Evaluation of Liquefaction potential based on SPT-Force Isolation – Motion Isolation – Use of spring and damping materials – Vibration control of existing machine foundation – Screening of vibration – Open trenches – Pile Barriers – Salient construction aspects of machine Foundations.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the student will be able to

Understand the theory and measurement of vibration.

Understand the concept of wave propagation in infinite medium and due to machine foundation.

Get knowledge on dynamic properties of soils and laboratory and field testing.

Design of foundation for different types of machines

Understand liquefaction, motion isolation and vibration control.

TEXT BOOKS:

Swamisaran, “Soil Dynamics and Machine Foundations”, Galgotia Publications Pvt.Ltd. New Delhi-110002, 3rd Edition 2016.

Kameswara Rao., “Dynamics Soil Tests and Applications”, Wheeler Publishing, New Delhi, 2003.

P. Srinivasulu, and C.V. Vaidyanathan, “Handbook of Machine Foundations”, Tata McGraw-Hill, 2007

REFERENCES:

Kamaswara Rao., “Vibration Analysis and Foundation Dynamics”, Wheeler Publishing, New Delhi, 1998.

IS Code of Practice for Design and Construction of Machine Foundations, McGrew Hill, 1996.

Moore, P.J., “Analysis and Design of Foundation for Vibration”, Oxford and IBH, 2005

Steven L. Kramer, “Geotechnical Earthquake Engineering”, Prentice Hall, 1996.

IS Code 5249: 1992 (Reaffirmed 2006) “Determination of Dynamic Properties of Soil – Method of Test” Bureau of Indian Standards, New Delhi.

IS Code 2974: (Part 1) 1982 (Reaffirmed 2008) “Code of Practice for Design and Construction of Machine Foundations - Foundation for Reciprocating Type Machines” Bureau of Indian Standards, New Delhi.

IS Code 2974: (Part 2) 1980 (Reaffirmed 2008) “Code of Practice for Design and Construction of Machine Foundations - Foundations for Impact Type Machines (Hammer Foundations)” Bureau of Indian Standards, New Delhi.

IS Code 2974: (Part 3) 1992 (Reaffirmed 2006) “Code of Practice for Design and Construction of Machine Foundations - Foundations for Rotary Type Machines (Medium and High Frequency)” Bureau of Indian Standards, New Delhi.

CE8003 ROCK ENGINEERING LTPC
3 003

OBJECTIVE:

To impart knowledge on fundamentals of rock mechanics and its application in solving simple problems associated with rock slopes and underground openings. Student gains the knowledge on the mechanics of rock and its applications in underground structures and rock slope stability analysis.

UNIT I CLASSIFICATION AND INDEX PROPERTIES OF ROCKS 6

Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose – Rock Mass Rating and Q System.

UNIT II ROCK STRENGTH AND FAILURE CRITERIA 12

Modes of rock failure – Strength of rock – Laboratory measurement of shear, tensile and compressive strength. Stress - strain behaviour of rock under Hydrostatic compression and deviatoric loading – Mohr –Coulomb failure criteria and Hock and Brown empirical criteria

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS 10

Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – measurements of in-situ stresses – Hydraulic fracturing – Flat jack method – Over coring method

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING 10

Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.

UNIT V ROCK STABILISATION 7

Introduction – Rock support and Rock reinforcement – Principles – Support reaction curves – Shotcreting.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the student will be able to

Classify the rocks, study the index properties of rock systems.
Understand the modes of rock failure, stares-strain characteristics, failure criteria.
Estimate the stresses in rocks.
Apply rock mechanics in engineering.
Get knowledge on rock stabilization.

TEXTBOOKS:

Goodman, P.E. “Introduction to Rock Mechanics”, John Wiley and Sons, 1999.
Stillborg B., “Professional User Handbook for rock Bolting”, Tran Tech Publications, 1996.
Ramamurthy T., “Engineering in Rocks for Slopes Foundations and Tunnels”, PHI Learning Pvt. Ltd., 3rd Edition, 2014.

REFERENCES:

Brown, E.T. “Rock Characterisation Testing and Monitoring”. Pergaman Press 1991.
Arogyaswamy, R.N.P., Geotechnical Application in Civil Engineering”, Oxford and IBH, 1991.
Brady, B.H.G. and Brown, E.T., Rock mechanics for underground mining (Third Edition), Kluwer Academic Publishers, Dordrecht, 2006.

CE8004 URBAN PLANNING AND DEVELOPMENT LTPC
300 3

OBJECTIVE:

To enable students to have the knowledge on planning process and to introduce to the students about the regulations and laws related to Urban Planning.

UNIT I BASIC ISSUES 8

Definition of Human settlement, Urban area, Town, City, Urbanisation, Suburbanisation, Urban sprawl, Peri - urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanisation at International, National, Regional and State level.

UNIT II PLANNING PROCESS 8

Principles of Planning – Types and Level of Plan, Stages in Planning Process – Goals, Objectives, Delineation of Planning Areas, Surveys and Questionnaire Design.

UNIT III DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION 10

Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights , Special Economic Zones- Development of small town and smart cities-case studies

UNIT IV PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS 9

Site Analysis, Layout Design, Planning Standards, Project Formulation – Evaluation, Plan Implementation, Constraints and Implementation, Financing of Urban Development Projects.

UNIT V LEGISLATION, DEVELOPMENTAND MANAGEMENT OF URBAN SYSTEM 10

Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations, Involvement of Public, Private, NGO, CBO and Beneficiaries.

TOTAL : 45 PERIODS

OUTCOMES:

The students completing the course will have the ability to

Describe basic issues in urban planning
Formulate plans for urban and rural development and
Plan and analyse socio economic aspects of urban and rural planning
Design of urban development projects.
Manage urban development projects.

TEXTBOOKS:

Goel, S.L Urban Development and Management, Deep and Deep publications, New Delhi 2002
George Chadwick, A Systems view of planning, Pergamon press, Oxford 1978
Singh V.B, Revitalised Urban Administration in India, Kalpaz publication, Delhi, 2001
Edwin S.Mills and Charles M.Becker, Studies in Urban development, A World Bank publication, 1986

REFERENCES:

Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai

Goel S.L., Urban Development and Management, Deep and Deep Publications, New Delhi, 2002

Thooyavan, K.R., Human Settlements – A Planning Guide to Beginners, M.A Publications, Chennai, 2005

CMDA, Second Master Plan for Chennai, Chennai 2008

CE8005 AIR POLLUTION AND CONTROL ENGINEERING

LTPC
3 003

OBJECTIVE:

To impart knowledge on the principle and design of control of Indoor/ particulate/ gaseous air pollutant and its emerging trends.

UNIT I INTRODUCTION 7

Structure and composition of Atmosphere – Definition, Scope and Scales of Air Pollution – Sources and classification of air pollutants and their effect on human health, vegetation, animals, property, aesthetic value and visibility- Ambient Air Quality and Emission standards –Ambient and stack sampling and Analysis of Particulate and Gaseous Pollutants.

UNIT II METEOROLOGY 6

Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns- Atmospheric Diffusion Theories – Dispersion models, Plume rise.

UNIT III CONTROL OF PARTICULATE CONTAMINANTS 11

Factors affecting Selection of Control Equipment – Gas Particle Interaction – Working principle, Design and performance equations of Gravity Separators, Centrifugal separators Fabric filters, Particulate Scrubbers, Electrostatic Precipitators – Operational Considerations.

UNIT IV CONTROL OF GASEOUS CONTAMINANTS 11

Factors affecting Selection of Control Equipment – Working principle, Design and performance equations of absorption, Adsorption, condensation, Incineration, Bio scrubbers, Bio filters – Process control and Monitoring - Operational Considerations.

UNIT V INDOOR AIR QUALITY MANAGEMENT 10

Sources, types and control of indoor air pollutants, sick building syndrome and Building related illness- Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures.

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will have

an understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management

ability to identify, formulate and solve air and noise pollution problems

ability to design stacks and particulate air pollution control devices to meet applicable standards.

Ability to select control equipments.

Ability to ensure quality, control and preventive measures.

TEXTBOOKS:

Lawrence K. Wang, Norman C. Pareira, Yung Tse Hung, “Air Pollution Control Engineering”, Tokyo, springer science + science media LLC,2004.

Noel de Nevers, “Air Pollution Control Engineering”, Waveland press,Inc 2017.

Anjaneyulu. Y, “Air Pollution and Control Technologies‟, Allied Publishers (P) Ltd., India 2002.

REFERENCES:

David H.F. Liu, Bela G. Liptak, “Air Pollution”, Lweis Publishers, 2000.

Arthur C. Stern, “Air Pollution (Vol.I – Vol.VIII)”, Academic Press, 2006.

Wayne T.Davis, “Air Pollution Engineering Manual”, John Wiley & Sons, Inc, 2000.

M.N Rao and HVN Rao, “Air Pollution”,Tata Mcgraw Hill Publishing Company limited,2007.

C.S.Rao, “Environmental Pollution Control Engineering”,New Age International(P) Limited Publishers,2006.

GE8075 INTELLECTUAL PROPERTY RIGHTS L T P C
3003

OBJECTIVE:

To give an idea about IPR, registration and its enforcement.

UNIT I INTRODUCTION 9

Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II REGISTRATION OF IPRs 10

Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad

UNIT III AGREEMENTS AND LEGISLATIONS 10

International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT IV DIGITAL PRODUCTS AND LAW 9

Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection – Unfair Competition – Meaning and Relationship between Unfair Competition and IP Laws – Case Studies.

UNIT V ENFORCEMENT OF IPRs 7

Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

TOTAL:45 PERIODS

OUTCOME:

Ability to manage Intellectual Property portfolio to enhance the value of the firm.

TEXTBOOKS:

V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012

S. V. Satakar, “Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002

REFERENCES:

Deborah E. Bouchoux, “Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets”, Cengage Learning, Third Edition, 2012.

Prabuddha Ganguli,”Intellectual Property Rights: Unleashing the Knowledge Economy”, McGraw Hill Education, 2011.

Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

CE8006 PAVEMENT ENGINEERING LT PC 3003

OBJECTIVE:

Student gains knowledge on various IRC guidelines for designing rigid and flexible pavements. Further, the student will be in a position to assess quality and serviceability conditions of roads.

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTIONON LAYERED SYSTEM 8

Introduction – Pavement as layered structure – Pavement types rigid and flexible. Resilient modulus - Stress and deflections in pavements under repeated loading.

UNIT II DESIGN OF FLEXIBLE PAVEMENTS 10

Flexible pavement design Factors influencing design of flexible pavement, Empirical – Mechanistic empirical and theoretical methods – Design procedure as per IRC guidelines – Design and specification of rural roads.

UNIT III DESIGN OF RIGID PAVEMENTS 9

Cement concrete pavements Factors influencing CC pavements – Modified Westergaard approach – Design procedure as per IRC guidelines – Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE 10

Pavement Evaluation - Causes of distress in rigid and flexible pavements – Evaluation based on Surface Appearance, Cracks, Patches and Pot Holes, Undulations, Raveling, Roughness, Skid Resistance. Structural Evaluation by Deflection Measurements - Pavement Serviceability index, - Pavement maintenance (IRC Recommendations only).

UNIT V STABILIZATION OF PAVEMENTS 8

Stabilisation with special reference to highway pavements – Choice of stabilizers – Testing and field control - Stabilisation for rural roads in India – Use of Geosynthetics in roads.

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will

Get knowledge about types of rigid and flexible pavements.

Able to design of rigid pavements.

Able to design of flexible pavements.

Determine the causes of distress in rigid and flexible pavements.

Understand stailisation of pavements, testing and field control.

TEXTBOOKS:

Khanna, S.K. and Justo C.E.G.and Veeraragavan, A, “Highway Engineering”, New Chand and Brothers, Revised 10th Edition, 2014.

Kadiyali, L.R., “Principles and Practice of Highway Engineering”, Khanna tech. Publications, New Delhi, 2005.

REFERENCES:

Yoder, R.J. and Witchak M.W. “Principles of Pavement Design”, John Wiley 2000.

Guidelines for the Design of Flexible Pavements,IRC-37–2001,The Indian roads Congress, New Delhi.

Guideline for the Design of Rigid Pavements for Highways, IRC 58-1998, The Indian Road Congress, New Delhi.

CE8007 TRAFFIC ENGINEERING AND MANAGEMENT LTPC

3 0 0 3

OBJECTIVE:

To give an overview of Traffic engineering, traffic regulation, management and traffic safety with integrated approach in traffic planning as well.

UNIT I TRAFFIC PLANNING AND CHARACTERISTICS 9

Road Characteristics – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow – Urban Traffic problems in India – Integrated planning of town ,country ,regional and all urban infrastructure – Towards Sustainable approach. – land use & transport and modal integration.

UNIT II TRAFFIC SURVEYS 10

Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey including nonmotorized transports – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Accident analyses -Methods, interpretation and presentation – Statistical applications in traffic studies and traffic forecasting – Level of service – Concept, applications and significance.

UNIT III TRAFFIC DESIGN AND VISUAL AIDS 10

Intersection Design - channelization, Rotary intersection design – Signal design – Coordination of signals –– Grade separation - Traffic signs including VMS and road markings – Significant roles of traffic control personnel - Networking pedestrian facilities & cycle tracks.

UNIT IV TRAFFIC SAFETY AND ENVIRONMENT 8

Road accidents – Causes, effect, prevention, and cost – Street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, abatement measures – Promotion and integration of public transportation – Promotion of non-motorized transport.

UNIT V TRAFFIC MANAGEMENT 8

Area Traffic Management System - Traffic System Management (TSM) with IRC standards –- Traffic Regulatory Measures-Travel Demand Management (TDM) – Direct and indirect methods – Congestion and parking pricing – All segregation methods- Coordination among different agencies – Intelligent Transport System for traffic management, enforcement and education.

TOTAL: 45 PERIODS

OUTCOMES:

On completing this course, the Students will be able to

Analyse traffic problems and plan for traffic systems various uses

Design Channels, Intersections, signals and parking arrangements

Develop Traffic management Systems

TEXTBOOKS:

Kadiyali.L.R. "Traffic Engineering and Transport Planning", Khanna Publishers, Delhi, 2013

Indian Roads Congress (IRC) Specifications: Guidelines and Special Publications on Traffic Planning and Management.

Salter. R.I and Hounsell N.B, "Highway Traffic Analysis and design", Macmillan Press Ltd. 1996.

REFERENCES:

Fred L. Mannering, Scott S. Washburn and Walter P.Kilareski, Principles of Highway Engineering and Traffic Analysis, Wiley India Pvt. Ltd., New Delhi, 2011

Garber and Hoel, "Principles of Traffic and Highway Engineering", CENGAGE Learning,New Delhi, 2010

SP:43-1994, IRC Specification, "Guidelines on Low-cost Traffic Management Techniques" for Urban Areas, 1994

John E Tyworth, "Traffic Management Planning, Operations and control", Addison Wesly Publishing Company, 1996

Hobbs.F.D. "Traffic Planning and Engineering", University of Brimingham, Peragamon Press Ltd, 2005

Taylor MAP and Young W, "Traffic Analysis – New Technology and New Solutions", Hargreen Publishing Company, 1998.

CE8008 TRANSPORT AND ENVIRONMENT LTPC
3 003

OBJECTIVE:

The objective of this course is to create an awareness / overview of the impact of Transportation Projects on the environment and society..

UNIT I INTRODUCTION 8

Environmental Inventory, Environmental Assessment, Environmental Impact Assessment (EIA), Environmental Impact of Transportation Projects, Need for EIA, EIA Guidelines for Transportation Project, Historical Development.

UNIT II METHODOLOGIES 8

Elements of EIA – Screening and Scoping – Methods of Impact Analysis – Applications – Appropriate methodology.

UNIT III ENVIRONMENTAL IMPACT, PREDICTION AND ASSESSMENT 10

Prediction and Assessment of Impact of Transportation Project at various stages on water, air, noise, land acquisition and resettlement, Socio economic impact, indigenous people, aesthetics, health and safety, energy studies, IRC guidelines.

UNIT IV ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN 10

Mitigation of the impact on Natural and Man-made Environment, Health, Water, Land, Noise, Air, Public participation, Environmental Management Plan, Energy Conservation, Methods to reduce Global Warming.

UNIT V EIA CASE STUDIES 9

EIA Case Studies on Highway, Railway, Airways and Waterways Projects

TOTAL: 45 PERIODS

OUTCOMES:

Students will be able to

Understood the impact of Transportation projects on the environment.
Get knowledge on methods of impact analysis and their applications.
Understand environmental Laws on Transportation Projects and the mitigative measures adopted in the planning stage.
Predict and assess the impact of transportation projects.

TEXTBOOKS:

Canter, L.R., Environmental Impact Assessment, McGraw Hill, New Delhi, 1996.
Indian Road Congress (IRC), Environmental Impact of Highway Projects, IRC, Delhi, 1998.
P. Meenakshi, Elements of Environmental Science and Engineering, Prentice Hall of India, New Delhi, 2006
Thirumurthy A.M., Introduction to Environmental Science and Management, Shroff Publishers, Bombay, 2005

REFERENCES:

John G.Rau and David, C.Hooten, Environmental Impact Analysis Handbook, McGraw Hill Book Company, 1995
James H.Banks, Introduction to Transportation Engineering, McGraw Hill Book Company, 2000
World Bank, A Handbook on Roads and Environment, Vol.I and II, Washington DC, 1997
Priya Ranjan Trivedi, International Encyclopedia of Ecology and Environment – EIA, Indian Institute of Ecology and Environment, New Delhi, 1998

CE8009 INDUSTRIAL STRUCTURES L T P C 3003

OBJECTIVE:

To learn the planning, layout, functional aspects of industries and design of major steel and R.C structures needed for industries.

UNIT I PLANNING 9

Classification of industries and industrial structures – Site Planning and Selection – Exterior and interior Layout for Industries and buildings - Guidelines from factories act

UNIT II FUNCTIONAL REQUIREMENTS 9

Lighting – Ventilation – Noise and Vibration control – Fire safety

UNIT III DESIGN OF STEEL STRUCTURES 9

Pre-engineered and Mill buildings – Transmission Lines Towers – plate girders. Bunkers and Silos – pipe/cable racks- Chimney.

UNIT IV DESIGN OF R.C. STRUCTURES 9

Corbels, Brackets and Nibs - Silos and bunkers –Chimney –Cooling Towers (Principles only)

UNIT V PREFABRICATION 9

Principles of prefabrication and pre cast construction – Prestressed precast roof trusses - Floor slabs - Wall panels- Handling and erection stresses –joints in precast structures.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, students will be able to

Know the requirements of various industries and get an idea about the materials used and planning of various industrial components

Understand the functional requirements for industrial structures.

Design special steel structures like bunkers, silos, crane girders, chimneys and pre-engineered buildings.

Design special RC structures like corbels, silos, bunkers, chimneys, plates and shells.

Understand the principles of prefabrication and prestressing

TEXTBOOKS:

Ramamrutham.S., Design of Reinforced Concrete Structures, Dhanpat Rai Publishing Company, 2007.

Varghese.P.C., Advanced Reinforced Concrete Design, PHI, Eastern Economy Editions, Second Edition, 2005.

Subramanian, N., Design of Steel Structures, Oxford University Press, 2008.

Ramachandra and Virendra Gehlot, Design of steel structures –Vol. 2, Scientific Publishers, 2012.

REFERENCES:

Henn W. Buildings for Industry, Vol.I and II, London Hill Books, 1995

Handbook on Functional Requirements of Industrial buildings, SP32–1986, Bureau of Indian Standards, 1990.

Handbook of Industrial Lighting, Stanley L.Lyons, Butterworths, London.1981

Koncz, J., Manual of Precast Construction Vol. I and II, Bauverlay GMBH, 1971.

Handbook on Precast Construction, An Indian Concrete Institute Publication, 2016

CE8010 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT L T P C
3 0 0 3

OBJECTIVE:

To impart the knowledge and skills to identify, assess and mitigate the environmental and social impacts of developmental projects

UNIT I INTRODUCTION 9

Impacts of Development on Environment – Rio Principles of Sustainable Development-Environmental Impact Assessment (EIA) – Objectives – Historical development – EIA Types – EIA in project cycle –EIA Notification and Legal Framework–Stakeholders and their Role in EIA– Selection & Registration Criteria for EIA Consultants

UNIT II ENVIRONMENTAL ASSESSMENT 9

Screening and Scoping in EIA – Drafting of Terms of Reference,Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna - Matrices – Networks – Checklist Methods - Mathematical models for Impact prediction – Analysis of alternatives

UNIT III ENVIRONMENTAL MANAGEMENT PLAN 9

Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna – Environmental Monitoring Plan – EIA Report Preparation – Review of EIA Reports – Public Hearing-Environmental Clearance Post Project Monitoring

UNIT IV SOCIO ECONOMIC ASSESSMENT 9

Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts – Cost benefit Analysis-

UNIT V CASE STUDIES 9

EIA case studies pertaining to Infrastructure Projects – Real Estate Development - Roads and Bridges – Mass Rapid Transport Systems - Ports and Harbor – Airports - Dams and Irrigation projects - Power plants – CETPs- Waste Processing and Disposal facilities – Mining Projects.

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will have ability to

carry out scoping and screening of developmental projects for environmental and social assessments

explain different methodologies for environmental impact prediction and assessment

plan environmental impact assessments and environmental management plans

evaluate environmental impact assessment reports

TEXTBOOKS:

Canter, R.L, “Environmental impact Assessment “, 2nd Edition, McGraw Hill Inc, New Delhi,1995.

Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu, “Environmental Impact Assessment for Developing Countries in Asia”, Volume 1 – Overview, Asian Development Bank,1997.

Peter Morris, Riki Therivel “Methods of Environmental Impact Assessment”, Routledge Publishers,2009.

REFERENCES:

Becker H. A., Frank Vanclay,“The International handbook of social impact assessment” conceptual and methodological advances, Edward Elgar Publishing, 2003.

Barry Sadler and Mary McCabe, “Environmental Impact Assessment Training Resource Manual”, United Nations Environment Programme, 2002.

Judith Petts, “Handbook of Environmental Impact Assessment Vol. I and II”, Blackwell Science New York, 1998.

Ministry of Environment and Forests EIA Notification and Sectoral Guides, Government of India, New Delhi, 2010.

CE8011 DESIGN OF PRESTRESSED CONCRETE STRUCTURES LTPC 3003

OBJECTIVES:

To introduce the need for prestressing in a structure

To explain the methods, types and advantages of prestressing to the students.

To make the students to design a prestressed concrete structural elements and systems

To introduce the students the effect of prestressing in the flexural and shear behaviour of structural elements.

UNIT I INTRODUCTION – THEORY AND BEHAVIOUR 9

Basic concepts – Advantages and disadvantages – Materials required – Systems and methods of prestressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons – Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of prestress – Estimation of crack width.

UNIT II DESIGN FOR FLEXURE AND SHEAR 9

Basic assumptions of flexural design – Permissible stresses in steel and concrete as per I.S.1343 Code – Different Types of sections - Design of sections of Type I and Type II post-tensioned and pre tensioned beams – Check for flexural capacity based on I.S. 1343 Code – Influence of Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams – Design for shear based on I.S. 1343 Code.

UNIT III DEFLECTION AND DESIGN OF ANCHORAGE ZONE 9

Factors influencing deflections – Short term deflections of uncracked members – Prediction of long term deflections due to creep and shrinkage – Check for serviceability limit states. Determination of anchorage zone stresses in post-tensioned beams – design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams.

UNIT IV COMPOSITE BEAMS AND CONTINUOUS BEAMS 9

Analysis and design of composite beams – Methods of achieving continuity in continuous beams – Analysis for secondary moments – Concordant cable and linear transformation – Calculation of stresses – Principles of design.

UNIT V TENSION AND COMPRESSION MEMBERS 9

Role of prestressing in members subjected to Tensilr forces and compressive forces - Design of tension and compression members – Tanks, pipes and poles – Partial prestressing – Definition, methods of achieving partial prestressing, merits and demerits of partial prestressing.

TOTAL: 45 PERIODS

OUTCOMES:

On successful completion of this course, students will be able to:

- Understand the behaviour of prestressed concrete members and able to analyze the prestressed concrete beams.
- Design the prestressed concrete members for flexure and shear as per the relevant design code (IS 1343).
- Analyze for deflection of prestressed concrete members and design the anchorage zone.
- Analyze and design of composite beams and continuous beams.
- Design of prestressed concrete structures - sleepers, Tanks, pipes and poles.

TEXTBOOKS:

- Krishna Raju N., "Prestressed concrete", 5th Edition, Tata McGraw Hill Company, New Delhi, 2012
- Pandit.G.S. and Gupta.S.P., "Prestressed Concrete", CBS Publishers and Distributers Pvt. Ltd, 2012

REFERENCES:

- Rajagopalan.N, "Prestressed Concrete", Narosa Publishing House, 2002.
- Dayaratnam.P., "Prestressed Concrete Structures", Oxford and IBH, 2013
- Lin T.Y. and Ned.H.Burns, "Design of prestressed Concrete Structures", Third Edition, Wiley India Pvt. Ltd., New Delhi, 2013.
- IS1343:1980, Code of Practice for Prestressed Concrete, Bureau of Indian Standards, New Delhi, 2012
- IS 3370- Part 4 (2008) Indian standard Code of practice for concrete structures for the storage of liquid- Design tables, code of practice, bureau of Indian standards, new Delhi.

CE8012 CONSTRUCTION PLANNING AND SCHEDULING LTPC
3 003

OBJECTIVE:

To make the students to learn about planning of construction projects, scheduling procedures and techniques, cost and quality control projects and use of project information as decision making tool.

UNIT I CONSTRUCTION PLANNING 6

Basic concepts in the development of construction plans-Choice of Technology and Construction method-Defining Work Tasks- Work breakdown structure- Definition- Precedence relationships among activities-Estimating Activity Durations-Estimating Resource Requirements for work activities-coding systems.

UNIT II SCHEDULING PROCEDURES AND TECHNIQUES 12

Relevance of construction schedules-Bar charts - The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on-node and with leads, Lags and Windows-Calculations for scheduling with leads,lags and windows-Resource oriented scheduling-Scheduling with resource constraints and precedences -Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost tradeoffs -Improving the Scheduling process – Introduction to application software.

UNIT III COST CONTROL MONITORING AND ACCOUNTING 9

The cost control problem-The project budget-Forecasting for Activity cost control - financial accounting systems and cost accounts-Control of project cash flows-Schedule control-Schedule and Budget updates-Relating cost and schedule information.

UNIT IV QUALITY CONTROL AND SAFETY DURING CONSTRUCTION 9

Quality and safety Concerns in Construction-Organizing for Quality and Safety-Work and Material Specifications-Total Quality control-Quality control by statistical methods -Statistical Quality control with Sampling by Attributes-Statistical Quality control by Sampling and Variables-Safety.

UNIT V ORGANIZATION AND USE OF PROJECT INFORMATION 9

Types of project information-Accuracy and Use of Information-Computerized organization and use of Information - Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow.

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will have ability to

Understand basic concepts of construction planing.
Schedule the construction activities.
Forecast and control the cost in a construction.
Understand the quality control and safety during construction.
Organize information in Centralized database Management systems.

TEXTBOOKS:

Chitkara, K.K. “Construction Project Management Planning”, Scheduling and Control, Tata McGraw Hill Publishing Co., New Delhi, 2009
Srinath,L.S., “Pert and CPM Principles and Applications“, Affiliated East West Press, 2001

REFERENCES:

Chris Hendrickson and Tung Au, “Project Management for Construction – Fundamentals Concepts for Owners”, Engineers, Architects and Builders, Prentice Hall, Pitsburgh, 2000.

Moder.J., Phillips. C. and Davis E, “Project Management with CPM”, PERT and Precedence Diagramming, Van Nostrand Reinhold Co., 3rd Edition, 1985.

Willis., E.M., “Scheduling Construction projects”, John Wiley and Sons, 1986.

Halpin,D.W., “Financial and Cost Concepts for Construction Management”, John Wiley and Sons, New York, 1985.

EN8591 MUNICIPAL SOLID WASTE MANAGEMENT LTPC
3 003

OBJECTIVE:

To make the students conversant with the types, sources, generation, storage, collection, transport, processing and disposal of municipal solid waste.

UNIT I SOURCES AND CHARACTERISTICS 9

Sources and types of municipal solid wastes- Public health and environmental impacts of improper disposal of solid wastes- sampling and characterization of wastes - factors affecting waste generation rate and characteristics - Elements of integrated solid waste management – Requirements and salient features of Solid waste management rules (2016) –- Role of public and NGO‟s- Public Private participation – Elements of Municipal Solid Waste Management Plan.

UNIT II SOURCE REDUCTION , WASTE STORAGE AND RECYCLING 8

Waste Management Hierarchy - Reduction, Reuse and Recycling - source reduction of waste – On-site storage methods – Effect of storage, materials used for containers – segregation of solid wastes – Public health and economic aspects of open storage – case studies under Indian conditions – Recycling of Plastics and Construction/Demolition wastes.

UNIT III COLLECTION AND TRANSFER OF WASTES 8

Methods of Residential and commercial waste collection – Collection vehicles – Manpower – Collection routes – Analysis of waste collection systems; Transfer stations –location, operation and maintenance; options under Indian conditions – Field problems- solving.

UNIT IV PROCESSING OF WASTES 12

Objectives of waste processing – Physical Processing techniques and Equipment; Resource recovery from solid waste composting and biomethanation; Thermal processing options – case studies under Indian conditions.

UNIT V WASTE DISPOSAL 8

Land disposal of solid waste- Sanitary landfills – site selection, design and operation of sanitary landfills – Landfill liners – Management of leachate and landfill gas- Landfill bioreactor – Dumpsite Rehabilitation

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will demonstrate

understanding of the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management.

Reduction, reuse and recycling of waste.

ability to plan and design systems for storage, collection, transport, processing and disposal of municipal solid waste.

knowledge on the issues on solid waste management from an integrated and holistic perspective, as well as in the local and international context.

Design and operation of sanitary landfill.

TEXTBOOKS:

William A. Worrell, P. Aarne Vesilind (2012) Solid Waste Engineering, Cengage Learning, 2012.

John Pitchel (2014), Waste Management Practices-Municipal, Hazardous and industrial – CRC Press, Taylor and Francis, New York.

REFERENCES:

1. CPHEEO (2014), "Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation , Government of India, New Delhi.

George Tchobanoglous and FrankKreith (2002).Handbook of Solid waste management, McGraw Hill, New York.

GE8077 TOTAL QUALITY MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:

To facilitate the understanding of Quality Management principles and process.

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.

UNIT II TQM PRINCIPLES 9

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I 9

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II 9

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM 9

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation—Documentation—Internal Audits—Registration--**ENVIRONMENTAL MANAGEMENT SYSTEM:** Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001—Benefits of EMS.

TOTAL: 45 PERIODS

OUTCOME:

The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXTBOOK:

Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield, Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, “Total Quality Management”, Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

REFERENCES:

James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.

Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.

ISO9001-2015 standards

GE8072	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the global trends and development methodologies of various types of products and services

To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems

To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification

To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics

To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends - Environmental Trends - Political/Policy Trends **- Introduction to Product Development Methodologies and Management -** Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies Product Life Cycle – Product Development Planning and Management.

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9

Requirement Engineering - Types of Requirements - Requirement Engineering - traceability Matrix and Analysis - Requirement Management - **System Design & Modeling -** Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design.

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – **Challenges in Integration of Engineering Disciplines** - Concept Screening & Evaluation - **Detailed Design -** Component Design and Verification – **Mechanical, Electronics and Software Subsystems** - High Level Design/Low Level Design of S/W Program **-** Types of Prototypes, S/W Testing- Hardware Schematic, Component

design, Layout and Hardware Testing – **Prototyping -** Introduction to Rapid Prototyping and Rapid Manufacturing - **System Integration, Testing, Certification and Documentation**

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product Validation processes and stages - Product Testing Standards and Certification - Product Documentation **Sustenance -**Maintenance and Repair – Enhancements - **Product EoL -** Obsolescence Management – Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product Development in Industry versus Academia –**The IPD Essentials -** Introduction to Vertical Specific Product Development processes -Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and Software Systems – Product Development Trade-offs - Intellectual Property Rights and Confidentiality – Security and Configuration Management.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Define, formulate and analyze a problem
Solve specific problems independently or as part of a team
Gain knowledge of the Innovation & Product Development process in the Business Context
Work independently as well as in teams
Manage a project from start to finish

TEXTBOOKS:

Book specially prepared by NASSCOM as per the MoU.
Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, Fifth Edition, 2011.
John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill, Eleventh Edition, 2005.

REFERENCES:

Hiriyappa B, “Corporate Strategy – Managing the Business”, Author House, 2013.
Peter F Drucker, “People and Performance”, Butterworth – Heinemann [Elsevier], Oxford, 2004.
Vinod Kumar Garg and Venkita Krishnan N K, “Enterprise Resource Planning – Concepts”, Second Edition, Prentice Hall, 2003.
Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, Seventh Edition, 2013

CE8013 COASTAL ENGINEERING LTPC 3003

OBJECTIVES:

The main purpose of coastal engineering is to protect harbors and improve navigation.
The students to the diverse topics as wave mechanics, wave climate, shoreline protection methods and laboratory investigations using model studies.

UNIT I INTRODUCTION TO COASTAL ENGINEERING 9

Indian Scenario - Classification of Harbours. Introduction - wind and waves - Sea and Swell - Introduction to small amplitude wave theory - use of wave tables- Mechanics of water waves - Linear (Airy) wave theory, Introduction to Tsunami

UNIT II WAVE PROPERTIES AND ANALYSIS 9

Behaviour of waves in shallow waters, Introduction to non-linear waves and their properties - Waves in shallow waters - Wave Refraction, Diffraction and Shoaling -Hindcast wave generation models, wave shoaling; wave refraction; wave breaking; wave diffraction random and 3D waves- Short term wave analysis - wave spectra and its utilities - Long term wave analysis- Statistics analysis of grouped wave data.

UNIT III COASTAL SEDIMENT TRANSPORT 9

Dynamic beach profile; cross-shore transport; along shore transport (Littoral transport), sediment movement

UNIT IV COASTAL DEFENSE 9

Field measurement; models, groins, sea walls, offshore breakwaters, artificial nourishment - planning of coast protection works - Design of shore defense structures

UNIT V MODELING IN COASTAL ENGINEERING 9

Physical modeling in Coastal Engineering - Limitations and advantages - Role of physical modeling in coastal engineering - Numerical modeling - Modeling aspects - limitations - Tsunami mitigation measures –

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

Understand coastal engineering aspects of harbors methods to improve navigation
Understand the wave properties and analysis of wave.
Understand the concepts of sediment transport.
Design of shore defense structures.
Gain knowledge in modeling in coastal engineering.

REFERENCES:

Mani J.S., Coastal Hydrodynamics. PHI Pvt. Ltd. New Delhi - 2012.
Dean, R.G. and Dalrymple, R.A., Water wave mechanics for Engineers and Scientists, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1994.
Ippen, A.T., Estuary and Coastline Hydrodynamics, McGraw-Hill, Inc., New York, 1978.
Sorenson, R.M., Basic Coastal Engineering, A Wiley-Interscience Pub. New York, 1978.
Coastal Engineering Manual, Vol. I-VI, Coastal Engineering Research Centre, Dept. of the Army, US Army Corps of Engineers, Washington DC, 2006.

CE8014 PARTICIPATORY WATER RESOURCES MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:

To gain an insight on local and global perceptions and approaches on participatory water resource management

UNIT I FUNDAMENTALS: SOCIOLOGY AND PARTICIPATORY APPROACH 6

Sociology – Basic concepts – Perspectives- Social Stratification – Irrigation as a Socio technical Process - Participatory concepts– Objectives of participatory approach

UNIT II UNDERSTANDING FARMERS PARTICIPATION 10

Farmers participation –need and benefits – Comparisons of cost and benefit -Sustained system performance - Kinds of participation – Context of participation, factors in the environment – WUA - Constraints in organizing FA – Role of Community Organiser – Case Studies.

UNIT III ISSUES IN WATER MANAGEMENT 9

Multiple use of water – Issues in Inter-sectoral Water Allocation - domestic, irrigation, industrial sectors - modernization techniques – Rehabilitation – Command Area Development - Water delivery systems

UNIT IV PARTICIPATORY WATER CONSERVATION 10

Global Challenges -Social – Economic – Environmental - Solutions –Political - Water Marketing – Water Rights -Consumer education – Success Stories Case Studies

UNIT V PARTICIPATORY WATERSHED DEVELOPMENT 10

Concept and significance of watershed - Basic factors influencing watershed development –- Principles of watershed management - Definition of watershed management – Identification of problems - Watershed approach in Government programmes –- People,s participation – Entry point activities - Evaluation of watershed management measures.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

Gain knowledge on various processes involved in participatory water resource management.
Understand famers participation in water resources management.
Aware of the issues related to water conservation and watershed Development
Get knowledge in participatory water conservation
Understand concept, principle , approach of watershed management.

TEXTBOOKS:

Sivasubramaniyan, K. Water Management, SIMRES Publication, Chennai, 2011
Uphoff.N., Improving International Irrigation management with Farmer Participation – Getting the process Right – Studies in water Policy and management, No.11, Westview press, Boulder,CO, 1986.
Tideman, E.M., “Watershed Management”, Omega Scientific Publishers, New Delhi, 1996.

REFERENCE:

1**.** Chambers Robert, Managing canal irrigation, Cambridge University Press, 1989

CE8015 INTEGRATED WATER RESOURCES MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

To introduce the students to the interdisciplinary analysis of water and conceptual design of intervention strategies.
To develop a knowledge-base on capacity building on IWRM.

UNIT I IWRM FRAMEWORK 9

Definition – Objectives – Principles - Evolution of IWRM - IWRM relevance in water resources management – Paradigm shift : Processes and prospective outcomes

UNIT II CONTEXTUALIZING IWRM 9

UN formulations - SDG goals - IWRM in Global, Regional and Local water partnership – Institutional transformation - Bureaucratic reforms - Inclusive development

UNIT III EMERGING ISSUES IN WATER MANAGEMENT 9

Emerging Issues -– Drinking water management in the context of climate change - IWRM and irrigation - Flood – Drought – Pollution – Linkages between water, health and poverty

UNIT IV IWRM AND WATER RESOURCES DEVELOPMENT IN INDIA 9

Rural Development - Ecological sustainability- -Watershed development and conservation - Ecosystem regeneration – Wastewater reuse - Sustainable livelihood - Food security

UNIT V ASPECTS OF INTEGRATED DEVELOPMENT 9

Capacity building - Conceptual framework of IWRM – Problems and policy issues - Solutions for effective integrated water management - Case studies

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

Understand objectives, principles and evolution of integrated water resources management.
Have an idea of contextualizing IWRM
Gain knowledge in emerging issues in water management, flood, drought, pollution and poverty.
Understand the water resources development in India and wastewater reuse.
Gain knowledge on integrated development of water management.

TEXTBOOKS:

Mollinga P. *et al.* "Integrated Water Resources Management", Water in South Asia Volume I, Sage Publications, 2006.
Sithamparanathan, Rangasamy, A., and Arunachalam, N., "Ecosystem Principles and Sustainable Agriculture", Scitech Publications (India) Pvt.Lt, Chennai, 1999.

REFERENCES:

Cech Thomas V., Principles of Water Resources: History, Development, Management and Policy. John Wiley and Sons Inc., New York. 2003.
Murthy, J.V.S., "Watershed Management in India", Wiley Eastern Ltd., New York, 1995.
Dalte, S.J.C., "Soil Conservation and Land Management", International Book Distribution, India, 1986.

CE8016 GROUNDWATER ENGINEERING LTPC
30 03

OBJECTIVES:

To introduce the student to the principles of Groundwater governing Equations and Characteristics of different aquifers,
To understand the techniques of development and management of groundwater.

UNIT I HYDROGEOLOGICAL PARAMETERS 9

Introduction – Water bearing Properties of Rock – Type of aquifers - Aquifer properties – permeability, specific yield, transmissivity and storage coefficient – Methods of Estimation – GEC

norms - Steady state flow - Darcy,s Law - Groundwater Velocity –- Dupuit Forchheimer assumption – Steady Radial Flow into a Well

UNIT II WELL HYDRAULICS 9

Unsteady state flow - Theis method - Jacob method – Chow,s method – Law of Times – Theis Recovery – Bailer method – Slug method - tests - Image well theory – Partial penetrations of wells – Well losses – Specific Capacity and Safe yield - Collector well and Infiltration gallery

UNIT III GROUNDWATER MANAGEMENT 9

Need for Management Model – Database for Groundwater Management – Groundwater balance study – Introduction to Mathematical model – Model Conceptualization – Initial and Boundary Condition – Calibration – Validation – Future Prediction – Sensitivity Analysis – Uncertainty – Development of a model

UNIT IV GROUNDWATER QUALITY 9

Ground water chemistry - Origin, movement and quality - Water quality standards – Drinking water – Industrial water – Irrigation water - Ground water Pollution and legislation - Environmental Regulatory requirements

UNIT V GROUNDWATER CONSERVATION 9

Artificial recharge techniques – Reclaimed wastewater recharge – Soil aquifer treatment (SAT) – Aquifer Storage and Recovery (ASR)Seawater Intrusion and Remediation – Ground water Basin management and Conjunctive use – Protection zone delineation, Contamination source inventory and remediation schemes

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

Understand aquifer properties and its dynamics
Get an exposure towards well design and practical problems
Develop a model for groundwater management.
Students will be able to understand the importance of artificial recharge and groundwater quality concepts
Gain knowledge on conservation of groundwater.

TEXTBOOKS:

Raghunath H.M., "Ground Water Hydrology", New Age International (P) Limited, New Delhi, 2010.
Todd D.K., "Ground Water Hydrology", John Wiley and Sons, New York, 2000.

REFERENCES:

Fitts R Charles, "Groundwater Science". Elsevier, Academic Press, 2002.
Ramakrishnan, S, Ground Water, K.J. Graph arts, Chennai, 1998.

CE8017 WATER RESOURCES SYSTEMS ENGINEERING LTPC 3003

OBJECTIVES:

To introduce the student to the concept of Mathematical approaches for managing the water resources system.
To make the students apply an appropriate system approach to optimally operate a water resource system.

UNIT I SYSTEM APPROACH 9

Definition, classification, and characteristics of systems - Philosophy of modelling – Goals and Objectives – Basics of system analysis concept – steps in systems engineering.

UNIT II LINEAR PROGRAMMING 9

Introduction to Operation research - Linear programming Problem Formulation-graphical solution-Simplex method –Sensitivity analysis - application to operation of single purpose reservoir

UNIT III DYNAMIC PROGRAMMING 9

Bellman,s optimality criteria, problem formulation and solutions – Water Allocation for three state (user), Forward and Backward Recursion techniques in Dynamic Programming - Shortest pipe line route problem - Application to reservoirs capacity expansion

UNIT IV SIMULATION 9

Basic principles and concepts – Monte Carlo techniques – Model development – Inputs and outputs – Single and multipurpose reservoir simulation models – Deterministic simulation – Rule Curve development for reservoir

UNIT V ADVANCED OPTIMIZATION TECHNIQUES 9

Integer and parametric linear programming – Goal programming types – Applications to reservoir release optimization – application of evolutionary algorithms like Genetic algorithm, Particle swarm, Simulated Annealing to reservoir release optimization

TOTAL: 45 PERIODS

OUTCOMES:

The students will be

Eexposed to the economic aspects and analysis of water resources systems by which they will get an idea of comprehensive and integrated planning of a water resources project.

Understanding the concept of linear programming and apply in water resource system.

Understanding the concept of dynamic programming and apply in water resource system.

Develops simulation models.

Ddeveloping skills in solving problems in operations research through LP, DP and Simulation techniques.

TEXTBOOK:

Vedula, S., and Majumdar, P.P. "Water Resources Systems" – Modeling Techniques and Analysis Tata McGraw Hill, 5th reprint, New Delhi, 2010.

REFERENCES:

Hall Warren, A. and John A. Dracup., "Water Resources System Engineering", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1998

Chadurvedi M.C., "Water resource Systems Planning and Management", Tata McGraw Hill inc., New Delhi,1997

Taha H.A., "Operation Research", McMillan Publication Co., New York, 1995.

Maass A., Husfchimidt M.M., ,Dorfman R., ThomasH A., Marglin S.A and Fair G. M., "Design of Water Resources System", Hardward University Press, Cambridge, Mass.,1995.

Goodman Aluvin S., "Principles of Water Resources Planning", Prentice Hall of India, 1984

CE8018 GEO-ENVIRONMENTAL ENGINEERING L T P C 3 003

OBJECTIVE:

The student acquires the knowledge on the Geotechnical engineering problems associated with soil contamination, safe disposal of waste and remediate the contaminated soils by different techniques thereby protecting environment.

UNIT I GENERATION OF WASTES AND CONSQUENCES OF SOIL POLLUTION 8

Introduction to Geo environmental engineering – Environmental cycle – Sources, production and classification of waste – Causes of soil pollution – Factors governing soil pollution interaction clay minerals - Failures of foundation due to waste movement.

UNIT II SITE SELECTION AND SAFE DISPOSAL OF WASTE 10

Safe disposal of waste – Site selection for landfills – Characterization of land fill sites and waste – Risk assessment – Stability of landfills – Current practice of waste disposal – Monitoring facilities – Passive containment system – Application of geosynthetics in solid waste management – Rigid or flexible liners.

UNIT III TRANSPORT OF CONTAMINANTS 8

Contaminant transport in sub surface – Advection, Diffusion, Dispersion – Governing equations – Contaminant transformation – Sorption – Biodegradation – Ion exchange – Precipitation – Hydrological consideration in land fill design – Ground water pollution.

UNIT IV WASTE STABILIZATION 10

Stabilization - Solidification of wastes – Micro and macro encapsulation – Absorption, Adsorption, Precipitation – Detoxification – Mechanism of stabilization – Organic and inorganic stabilization – Utilization of solid waste for soil improvement – case studies.

UNIT V REMEDIATION OF CONTAMINATED SOILS 9

Exsitu and Insitu remediation-Solidification, bio-remediation, incineration, soil washing, phyto remediation, soil heating, vetrification, bio-venting.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

Assess the contamination in the soil
Understand the current practice of waste disposal
To prepare the suitable disposal system for particular waste.
Stabilize the waste and utilization of solid waste for soil improvement.
Select suitable remediation methods based on contamination.

TEXTBOOKS:

Hari D. Sharma and Krishna R. Reddy, “Geo-Environmental Engineering” –John Wiley and Sons, INC, USA, 2004.

Daniel B.E., “Geotechnical Practice for waste disposal”, Chapman & Hall, London 1993.

Manoj Datta,” Waste Disposal in Engineered landfills”, Narosa Publishing House, 1997.

Manoj Datta, B.P. Parida, B.K. Guha, “Industrial Solid Waste Management and Landfilling Practice”, Narosa Publishing House, 1999.

REFERENCES:

Westlake, K, “Landfill Waste pollution and Control”, Albion Publishing Ltd., England, 1995.

Wentz, C.A., “Hazardous Waste Management”, McGraw Hill, Singapore, 1989

Proceedings of the International symposium on “Environmental Geotechnology” (Vol.I and II). Environmental Publishing Company, 1986 and 1989.

Ott, W.R., “Environmental indices, Theory and Practice”, Ann Arbor, 1978.

Fried, J.J., “Ground Water Pollution”, Elsevier, 1975.

ASTM Special Tech. Publication 874, Hydraulic Barrier in Soil and Rock, 1985.

Lagrega, M.D., Buckinham, P.L. and Evans, J.C., “Hazardous Waste Management” McGraw Hill Inc. Singapore, 1994.

CE8091 HYDROLOGY AND WATER RESOURCES ENGINEERING LTPC
3 0 0 3

OBJECTIVE:

To introduce the student to the concept of hydrological aspects of water availability and requirements and should be able to quantify, control and regulate the water resources.

UNIT I PRECIPITATION AND ABSTRACTIONS 10

Hydrological cycle- Meteorological measurements – Requirements, types and forms of precipitation - Rain gauges-Spatial analysis of rainfall data using Thiessen and Isohyetal methods-Interception - Evaporation. Horton‟s equation, pan evaporation measurements and evaporation suppression - Infiltration-Horton‟s equation - double ring infiltrometer, infiltration indices.

UNIT II RUNOFF 8

Watershed, catchment and basin - Catchment characteristics - factors affecting runoff - Run off estimation using empirical - Strange‟s table and SCS methods – Stage discharge relationships-flow measurements- Hydrograph – Unit Hydrograph – IUH

UNIT III FLOOD AND DROUGHT 9

Natural Disasters-Flood Estimation- Frequency analysis- Flood control- Definitions of droughts- Meteorological, hydrological and agricultural droughts- IMD method-NDVI analysis- Drought Prone Area Programme (DPAP)

UNIT IV RESERVOIRS 8

Classification of reservoirs, General principles of design, site selection, spillways, elevation – area - capacity - storage estimation, sedimentation - life of reservoirs – rule curve

UNIT V GROUNDWATER AND MANAGEMENT 10

Origin- Classification and types - properties of aquifers - governing equations – steady and unsteady flow - artificial recharge - RWH in rural and urban areas

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will have

an understanding of the key drivers on water resources, hydrological processes and their integrated behaviour in catchments,

ability to construct and apply a range of hydrological models to surface water and groundwater problems including Hydrograph, Flood/Drought management, artificial recharge

ability to conduct Spatial analysis of rainfall data and design water storage reservoirs

Understand the concept and methods of ground water management.

TEXTBOOKS:

Subramanya .K. "Engineering Hydrology"- Tata McGraw Hill, 2010

Jayarami Reddy .P. "Hydrology", Tata McGraw Hill, 2008.

Linsley, R.K. and Franzini, J.B. "Water Resources Engineering", McGraw Hill International Book Company, 1995.

REFERENCES:

David Keith Todd. "Groundwater Hydrology", John Wiley & Sons, Inc. 2007
Ven Te Chow, Maidment, D.R. and Mays, L.W. "Applied Hydrology", McGraw Hill International Book Company, 1998.
Raghunath .H.M., "Hydrology", Wiley Eastern Ltd., 1998.

GE8076 PROFESSIONAL ETHICS IN ENGINEERING LTPC 3003

OBJECTIVE:

To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES 10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS 9

Senses of ˆEngineering Ethics, – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg,s theory – Gilligan,s theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES 8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

TOTAL: 45 PERIODS

OUTCOME:

Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXT BOOKS:

Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.
Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

REFERENCES:

Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.

Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009.

John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003

Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.

World Community Service Centre, ˆ Value Education,, Vethathiri publications, Erode, 2011.

Web sources:

www.onlineethics.org
www.nspe.org
www.globalethics.org
www.ethics.org

CE8019	COMPUTER AIDED DESIGN OF STRUCTURES	L T P C
		3 0 0 3

OBJECTIVES:

To introduce the students about computer graphics, structural analysis, design and optimization and expert systems, applications in analysis.

UNIT I INTRODUCTION 9

Fundamental reason for implementing CAD - Software requirements – Hardware components in CAD system – Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS 9

Graphic Software – Graphic primitives - Transformations - 2 Dimensional and 3 Dimensional transformations – Concatenation - Wire frame modeling - Solid modeling - Graphic standards - Drafting packages .

UNIT III STRUCTURAL ANALYSIS 9

Principles of structural analysis - Fundamentals of finite element analysis - Concepts of finite elements – Stiffness matrix formulation – Variational Method – Weighted residual method – Problems – Convergence criteria – Analysis packages and applications.

UNIT IV DESIGN AND OPTIMIZATION 9

Principles of design of steel and RC structures - Beams and Columns - Applications to simple design problems - Optimization techniques - Algorithms - Linear programming – Simplex Method

UNIT V EXPERT SYSTEMS 9

Introduction to artificial intelligence - Knowledge based expert systems – Applications of Knowledge Based Expert Systems - Rules and decision tables - Inference mechanisms - simple applications

TOTAL: 45 PERIODS

OUTCOMES:

On successful completion of this course, students will be able to:

Understand the concepts of Computer-Aided Design, Software requirements and Hardware components in CAD system.

- Acquire the knowledge in Computer Graphics and Computer aided drafting using Auto CAD software.

Understand the fundamentals of finite element analysis and be able use software for modeling, analysis and design of structures.

Understand the concepts of Optimization techniques and its practical applications to structural engineering.

Acquire the knowledge in Artificial Intelligence and Knowledge based expert systems.

TEXTBOOKS:

Groover M.P. and Zimmers E.W. Jr., "CAD/CAM, Computer Aided Design and Manufacturing", Prentice Hall of India Ltd, New Delhi, 1993.

Krishnamoorthy C.S.Rajeev S., "Computer Aided Design", Narosa Publishing House, New Delhi, 2001.

REFERENCES:

Harrison H.B., "Structural Analysis and Design", Part I and II Pergamon Press, Oxford,1990.

Rao S.S., "Optimisation Theory and Applications", Wiley Eastern Limited, New Delhi, 1984.

Richard Forsyth (Ed), "Expert System Principles and Case Studies", Chapman and Hall, London, 1989.

CE8020 MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES L T P C
3 0 0 3

OBJECTIVE:

To acquire the knowledge on Quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

UNIT I IMAINTENANCE AND REPAIR STRATEGIES 9

Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating damaged structure, causes of deterioration.

UNIT II STRENGTH AND DURABILITY OF CONCRETE 9

Quality assurance for concrete–Strength, Durability- Cracks, different types, causes–Effects due to climate, temperature, Sustained elevated temperature, Corrosion

UNIT III SPECIAL CONCRETES 9

Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.

UNIT IV TECHNIQUES FOR REPAIR AND PROTECTION METHODS 9

Non-destructive Testing Techniques, Load Test for Stability-Epoxy injection, Shoring, Underpinning, Corrosion protection techniques–Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.

UNIT V REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES 9

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake-Transportation of Structures from one place to other –Structural Health Monitoring- demolition techniques-Engineered demolition methods-Case studies

TOTAL: 45 PERIODS

OUTCOMES:

Students will be able to understand

the importance of maintenance and assessment method of distressed structures.
the strength and durability properties ,their effects due to climate and temperature.
recent development in concrete
the techniques for repair rand protection methods
repair, rehabilitation and retrofitting of structures and demolition methods.

TEXT BOOKS:

Shetty.M.S.ConcreteTechnology-Theory and Practice,S.Chandand Company, 2008.

Vidivelli.B Rehabilitation of Concrete Structures Standard Publishes Distribution.1st edition 2009.

Varghese.P.C Maintenance Repair and Rehabilitation & Minor works of building, Prentice Hall India Pvt Ltd 2014.

Dodge Woodson.R Concrete Structures, Protection, Repair and Rehabilitation, Butterworth-Heinemann,Elsevier,New Delhi 2012

REFERENCES:

DovKominetzky.M.S.,-Design and Construction Failures, Galgotia, Publications Pvt.Ltd.,2001

Ravishankar.K. Krishnamoorthy.T.S, Structural Health Monitoring, Repair And Rehabilitation of Concrete Structures, Allied Publishers, 2004.

Hand book onSeismic Retrofit of Buildings,CPWD and Indian Buildings Congress, Narosa Publishers, 2008.

4.Hand Book on “Repair and Rehabilitation of RCC Buildings”–Director General works CPWD ,Govt of India , New Delhi–2002

CE8021 STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING LTPC
3 003

OBJECTIVE:

To understand the behaviour of dynamic loading. Study the effect of earthquake loading on the behaviour of structures. Understand the codal provisions to design the structures as earthquake resistant.

UNIT I SINGLE DEGREE OF FREEDOM SYSTEM 9

Definition of degree of freedom – Idealization of structure as Single Degree of Freedom (SDOF) system – Formulation of equation of motion for various SDOF system – D, Alemberts Principles – Effect of damping – Free and forced vibration of damped and undamped structures – Response to harmonic forces and periodic forces.

UNIT II MULTI DEGREE OF FREEDOM SYSTEM 9

Formulation of equation of motion for multidegree of freedom (MDOF) system – Evaluation of natural frequencies and modes – Eigen values and Eigen vectors – Response to free and forced vibration of undamped and damped MDOF systems – Modal superposition methods.

UNIT III INTRODUCTION TO EARTHQUAKE ENGINEERING 9

Elements of Engineering Seismology – Definitions, Introduction to Seismic hazard, Earthquake phenomenon – Seismotectonics – Seismic Instrumentation – Characteristics of Strong Earthquake motion – Estimation of Earthquake Parameters.

UNIT IV EARTHQUAKE EFFECTS ON STRUCTURES 9

Effect of earthquake on different types of structures – Behaviour of RCC, Steel and prestressed Concrete Structures under earthquake loading – Pinching Effect – Bouchinger Effects – Evaluation of Earthquake forces – IS Code 1893: 2002 – Response Spectra – Lessons learnt from past earthquakes.

UNIT V CONCEPTS OF EARTHQUAKE RESISTANT DESIGN 9

Causes of damage – Planning considerations/Architectural concept (IS 4326–1993) – Guidelines for Earthquake resistant design – Earthquake resistant design of masonry buildings – Design consideration – Guidelines – Earthquake resistant design of R.C.C. buildings – Lateral load analysis – Design and detailing (IS 13920:1993).

TOTAL: 45 PERIODS

OUTCOMES:

Student will develop knowledge in the simulation and mathematical model development.
Students will be trained to identify, formulate and solve complicated problem.
Students will be able to understand the role of natural calamity in the damage of structures.
Students will be able to develop the skill to analyse data and to apply the same in the practical problems.
Students will be able to apply the developed methodologies for the safe and stable design of structures.

TEXTBOOKS:

Mario Paz, Structural Dynamics – Theory and Computations, Fourth Edition, CBS publishers, 1997.
Agarwal.P and Shrikhande.M. Earthquake Resistant Design of Structures, Prentice Hall of India Pvt. Ltd. 2007.

REFERENCES:

Clough.R.W, and Penzien.J, Dynamics of Structures, Second Edition, McGraw Hill International Edition, 1995.
Jai Krishna, Chandrasekaran.A.R., and Brijesh Chandra, Elements of Earthquake Engineering, South Asia Publishers, 1994.
Minoru Wakabayashi, Design of Earthquake Resistant Buildings, Mc Graw – Hill Book Company, 1986
Humar.J.L, Dynamics of Structures, Prentice Hall Inc., 1990.
Anil K Chopra, Dynamics of structures – Theory and applications to Earthquake Engineering, Prentice Hall Inc., 2007.
Moorthy.C.V.R., Earthquake Tips, NICEE, IIT Kanpur,2002.
IS13920-1993 Ductile detailing of reinforced concrete structures subjected to seismic forces - Code of practice.
IS 1893 part 1 2002 Indian standard criteria for earthquake resistant design of structures.
IS 4326-1993 Earthquake Resistant Design and Construction of Buildings--Code of Practice (Second Revision)

CE8022 PREFABRICATED STRUCTURES L T P C 300 3

OBJECTIVE:

To impart knowledge to students on modular construction, industrialised construction and design of prefabricated elements and construction methods.

UNIT I INTRODUCTION 9

Need for prefabrication – Principles of prefabrication – Modular coordination – Standarization – Materials – Systems – Production – Transportation – Erection.

UNIT II PREFABRICATED COMPONENTS 9

Behaviour and types of structural components – Large panel systems – roof and floor slabs – Walls panels - Beams - Columns - Shear walls

UNIT III DESIGN PRINCIPLES 9

Design philosophy- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation - Demountable precast concrete systems.

UNIT IV JOINTS AND CONNECTIONS IN STRUCTURAL MEMBERS 9

Types of Joints – based on action of forces - compression joints - shear joints - tension joints - based on function - construction, contraction, expansion. Design of expansion joints - Dimensions and detailing - Types of sealants - Types of structural connections - Beam to Column - Column to Column - Beam to Beam - Column to foundation.

UNIT V DESIGN FOR ABNORMAL LOADS 9

Progressive collapse – Codal provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

TOTAL: 45 PERIODS

OUTCOMES:

The student will have good knowledge about design principles, layout of factory and stages of loading in precast construction.

Acquire knowledge about panel systems, slabs, connections used in precast construction and they will be in a position to design the elements.

Acquire knowledge about types of floor systems, stairs and roofs used in precast construction.

Acquire knowledge about types of walls used in precast construction, sealants, design of joints.

Acquire knowledge about components in industrial building.

TEXTBOOKS:

Bruggeling A.S. G and Huyghe G.F. "Prefabrication with Concrete", A.A. Balkema Publishers,USA,1991.

Lewitt,M. " Precast Concrete- Materials, Manufacture, Properties And Usage", Applied Science Publishers , London And New Jersey, 1982.

Bachmann, H. and Steinle, A. "Precast Concrete Structures", Ernst & Sohn, Berlin, 2011.

REFERENCES:

Koncz T., "Manual of precast concrete construction", Vol. I, II and III, Bauverlag, GMBH, 1976.

"Handbook on Precast Concrete Buildings", Indian Concrete Institute, 2016.

"Structural design manual", Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 2009.

CE8023 BRIDGE ENGINEERING L T P C
3003

OBJECTIVE:

To make the student to know about various bridge structures, selection of appropriate bridge structures and its design for given site conditions.

UNIT I INTRODUCTION 9

History of bridges - Components of a bridge - Classification of road bridges - Selection of site and initial decision process - Survey and alignment; Geotechnical investigations and interpretations. River Bridge: Selection of Bridge site and planning - Collection of bridge design data - Hydrological calculation

Road Bridges - IRC codes - Standard Loading for Bridge Design - Influence lines for statically determinate and indeterminate structures - Transverse distribution of Live loads among deck longitudinal - Load combinations for different working state and limit state designs

Railway Bridges: Loadings for Railway Bridges; Railroad data. Pre-design considerations - Railroad vs. Highway bridges.

UNIT II SUPERSTRUCTURES 9

Bridge decks – Structural forms and behaviour – Choices of superstructure types – Behaviour and modeling of bridge decks – Simple beam model – Plate model – Grillage method – Finite Element method - Different types of superstructure (RCC and PSC); Longitudinal Analysis of Bridge.- Transverse Analysis of Bridge - Temperature Analysis - Distortional Analysis - Effects of Differential settlement of supports - Reinforced earth structures

UNIT III DESIGN OF STEEL BRIDGES 9

Design of Truss Bridges – Design of Plate girder bridges.

UNIT IV DESIGN OF RC AND PSC BRIDGES 9

Design of slab bridges – T beam bridges – PSC bridges

UNIT V SUBSTRUCTURE, BEARINGS AND EXPANSION JOINTS, PARAPETS AND RAILINGS 9 Substructure **-** Pier; Abutment - Wing walls- Importance of Soil-Structure Interaction - Types of foundations - Open foundation- Pile foundation- Well foundation- Simply supported bridge-Continuous Bridge - Bearings and Expansion Joints - Different types of bridge bearings and expansion joints - Parapets and Railings for Highway Bridges

TOTAL: 45 PERIODS

OUTCOMES:

On successful completion of this course, students will be able to:

Identify loads on bridges and selection of type of bridge for the site condition
Analyze the super structure by various methods.
Design the trussed bridge and plate girder bridges
Design reinforced concrete slab and T beam bridges and prestressed concrete bridges
Decide the appropriate sub structural systems , bearings and expansion joints for the bridges.

TEXTBOOKS:

Johnson Victor D., “Essentials of Bridge Engineering”, Oxford and IBH Publishing Co., New Delhi, 2009.

Jagadeesh. T.R. and Jayaram. M.A., "Design of Bridge Structures", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2013

REFERENCES:

Phatak D.R., “Bridge Engineering”, Satya Prakashan, New Delhi, 1990.
Ponnuswamy S., “Bridge Engineering”, Tata McGraw-Hill, New Delhi, 1996.
Rajagopalan. N. “Bridge Superstructure”, Alpha Science International, 2006

GE8073 FUNDAMENTALS OF NANOSCIENCE L T P C
3 0 0 3

OBJECTIVE:

To learn about basis of nanomaterial science, preparation method, types and application

UNIT I INTRODUCTION 8

Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties:
Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II GENERAL METHODS OF PREPARATION 9

Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III NANOMATERIALS 12

Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications-Nanometal oxides-ZnO, TiO2,MgO, ZrO2, NiO, nanoalumina, CaO, AgTiO2, Ferrites, Nanoclays-functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

UNIT IV CHARACTERIZATION TECHNIQUES 9

X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques-AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation.

UNIT V APPLICATIONS 7

NanoInfoTech: Information storage- nanocomputer, molecular switch, super chip, nanocrystal, Nanobiotechlogy: nanoprobes in medical diagnostics and biotechnology, Nano medicines, Targetted drug delivery, Bioimaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nanosensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sunbarrier products - In Photostat, printing, solar cell, battery.

TOTAL : 45 PERIODS

OUTCOMES:

Will familiarize about the science of nanomaterials
Will demonstrate the preparation of nanomaterials
Will develop knowledge in characteristic nanomaterial

TEXT BOOKS :

A.S. Edelstein and R.C. Cammearata, eds., “Nanomaterials: Synthesis, Properties and Applications”, Institute of Physics Publishing, Bristol and Philadelphia, 1996.

N John Dinardo, “Nanoscale Charecterisation of surfaces & Interfaces”, 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000.

REFERENCES:

G Timp, “Nanotechnology”, AIP press/Springer, 1999.

Akhlesh Lakhtakia, “The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations”. Prentice-Hall of India (P) Ltd, New Delhi, 2007.

ANNA UNIVERSITY,
CHENNAI
NON-AUTONOMOUS COLLEGES AFFILIATED TO ANNA UNIVERSITY B. E. AUTOMOBILE ENGINEERING
REGULATIONS 2021
CHOICE BASED CREDIT SYSTEM
I AND II SEMESTERS (FULL TIME) CURRICULA AND SYLLABI

SEMESTER I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
THEORY								
2.	HS3151	Professional English - I	HSMC	3	1	0	4	4
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3	0	0	3	3
5.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
6.	GE3151	Problem Solving and Python Programming	ESC	3	0	0	3	3
PRACTICAL								
7	GE3171	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
8	BS3171	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
			TOTAL	**15**	**2**	**8**	**25**	**21**

SEMESTER II

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	HS3251	Professional English - II	HSMC	3	1	0	4	4
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	PH3251	Materials Science	BSC	3	0	0	3	3
4.	BE3251	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	3
5.	GE3251	Engineering Graphics	ESC	2	0	4	6	4
6.		NCC Credit Course Level 1*	-	2	0	0	2	2
PRACTICAL								
7.	GE3271	Engineering Practices Laboratory	ESC	0	0	4	4	2
8.	BE3271	Basic Electrical and Electronics Engineering Laboratory	ESC	0	0	4	4	2
			TOTAL	**14**	**2**	**12**	**28**	**22**

***** NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

IP3151 INDUCTION PROGRAMME

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it everyday for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage,

be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.
Discussions would be conducted in small groups of about 20 students with a faculty
mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References:
Guide to Induction program from AICTE

HS3151 PROFESSIONAL ENGLISH - I L T P C
3 1 0 4

COURSE OBJECTIVES:

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
- To use language efficiently in expressing their opinions via various media.

INTRODUCTION TO EFFECTIVE COMMUNICATION
1

- What is effective communication? (There are many interesting activities for this.)
- Why is communication critical for excellence during study, research and work?
- What are the seven C's of effective communication?
- What are key language skills?
- What is effective listening? What does it involve?
- What is effective speaking?
- What does it mean to be an excellent reader? What should you be able to do?
- What is effective writing?
- How does one develop language and communication skills?
- What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

UNIT I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION
11

Listening –for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form

Speaking - Self Introduction; Introducing a friend; Conversation - politeness strategies; Telephone conversation; Leave a voicemail; Leave a message with another person; asking for information to fill details in a form.

Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails.

Writing - Writing emails / letters introducing oneself

Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags

Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II NARRATION AND SUMMATION
12

Listening - Listening to podcast, anecdotes / stories / event narration; documentaries and interviews with celebrities.

Speaking - Narrating personal experiences / events; Interviewing a celebrity; Reporting / and summarizing of documentaries / podcasts/ interviews.

Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs.

Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions

Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

UNIT III DESCRIPTION OF A PROCESS / PRODUCT 12

Listening - Listen to a product and process descriptions; a classroom lecture; and advertisements about a products.

Speaking – Picture description; giving instruction to use the product; Presenting a product; and Summarizing a lecture.

Reading – Reading advertisements, gadget reviews; user manuals.

Writing - Writing definitions; instructions; and Product /Process description.

Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses.

Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words)

UNIT IV CLASSIFICATION AND RECOMMENDATIONS 12

Listening – Listening to TED Talks; Scientific lectures; and educational videos.

Speaking – Small Talk; Mini presentations and making recommendations.

Reading – Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc,.)

Writing – Note-making / Note-taking (*Study skills to be taught, not tested; Writing recommendations; Transferring information from nonverbal (chart, graph etc, to verbal mode)

Grammar – Articles; Pronouns - Possessive & Relative pronouns.

Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT V EXPRESSION 12

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions.

Speaking –group discussions, Debates and Expressing opinions through Simulations & Role play.

Reading – Reading editorials; and Opinion Blogs;

Writing – Essay Writing (Descriptive or narrative).

Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences.

Vocabulary - Cause & Effect Expressions – Content vs Function words.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able

- To listen and comprehend complex academic texts

- To read and infer the denotative and connotative meanings of technical texts
- To write definitions, descriptions, narrations and essays on various topics
- To speak fluently and accurately in formal and informal communicative contexts
- To express their opinions effectively in both oral and written medium of communication

TEXT BOOKS:

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021.
   Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book on Technical English By Lakshmi Narayanan, Scitech Publications (India) Pvt. Ltd.
3. English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill
   Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, R S Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.

MA3151	**MATRICES AND CALCULUS**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT - I MATRICES 9 + 3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications: Stretching of an elastic membrane.

UNIT - II DIFFERENTIAL CALCULUS 9 + 3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications : Maxima and Minima of functions of one variable.

UNIT - III FUNCTIONS OF SEVERAL VARIABLES 9 + 3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT - IV INTEGRAL CALCULUS 9 + 3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications: Hydrostatic force and pressure, moments and centres of mass.

UNIT - V MULTIPLE INTEGRALS 9 + 3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications: Moments and centres of mass, moment of inertia.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Able to use differential calculus ideas on several variable functions.
- Apply different methods of integration in solving practical problems.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS:

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES:

1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
2. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan. S. and Manicavachagom Pillai. T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, "Engineering Mathematics" Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus ", 14th Edition, Pearson India, 2018.

PH3151 ENGINEERING PHYSICS L T P C

3 0 0 3

COURSE OBJECTIVES

- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to be successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT I MECHANICS 9

Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

UNIT ELECTROMAGNETIC WAVES 9

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT II OSCILLATIONS, OPTICS AND LASERS 9

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference

–Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO_2 laser, semiconductor laser –Basic applications of lasers in industry.

UNIT IV BASIC QUANTUM MECHANICS 9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.

UNIT V APPLIED QUANTUM MECHANICS 9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

TOTAL : 45 PERIODS

COURSE OUTCOMES

After completion of this course, the students should be able to

- Understand the importance of mechanics.
- Express their knowledge in electromagnetic waves.
- Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
- Understand the importance of quantum physics.
- Comprehend and apply quantum mechanical principles towards the formation of energy bands.

TEXT BOOKS:

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw-Hill (Indian Edition), 2017.

REFERENCES:

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer-Verlag, 2012.

CY3151 ENGINEERING CHEMISTRY L T P C

3 0 0 3

COURSE OBJECTIVES:

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

UNIT I WATER AND ITS TREATMENT 9

Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler

corrosion, Caustic embrittlement, Priming &foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process.

UNIT II NANOCHEMISTRY 9

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT II PHASE RULE AND COMPOSITES 9

Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process.

Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and

whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; Power alcohol and biodiesel.

Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO_2 emission and carbon foot print.

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion-battery; Electric vehicles – working principles; Fuel cells: H_2-O_2 fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.

TOTAL: 45 PERIODS

COURSE OUTCOMES

At the end of the course, the students will be able:

- To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
- To apply the knowledge of phase rule and composites for material selection requirements.
- To recommend suitable fuels for engineering processes and applications.
- To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

GE3151 PROBLEM SOLVING AND PYTHON

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING 9

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators,

comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

TOTAL : 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems.
CO2: Develop and execute simple Python programs.
CO3: Write simple Python programs using conditionals and looping for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries etc.
CO6: Read and write data from/to files in Python programs.

TEXT BOOKS:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data'', Third Edition, MIT Press 2021

4. Eric Matthes, “Python Crash Course, A Hands - on Project Based Introduction to Programming”, 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill, 2018.

HS3251 PROFESSIONAL ENGLISH - II L T P C
3 1 0 4

COURSE OBJECTIVES

- To engage learners in meaningful language activities to improve their LSRW skills
- To enhance learners’ awareness of general rules of writing for specific audiences
- To help learners understand the purpose, audience, contexts of different types of writing
- To develop analytical thinking skills for problem solving in communicative contexts
- To demonstrate an understanding of job applications and interviews for internship and placements

UNIT I MAKING COMPARISONS 12

Listening – Evaluative Listening: Advertisements, Product Descriptions, -Audio / video; Listening and filling a Graphic Organiser (Choosing a product or service by comparison)
Speaking – Marketing a product, Persuasive Speech Techniques.
Reading - Reading advertisements, user manuals, brochures;
Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases
Vocabulary – Contextual meaning of words

UNIT II EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING 12

Listening - Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects - Speaking – Describing and discussing the reasons of accidents or disasters based on news reports.
Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint,
Writing - Writing responses to complaints.
Grammar - Active Passive Voice transformations, Infinitive and Gerunds Vocabulary – Word Formation (Noun-Verb-Adj-Adv),
Adverbs.

UNIT III PROBLEM SOLVING 12

Listening – Listening to / Watching movie scenes/ documentaries depicting a technical problem and suggesting solutions.
Speaking – Group Discussion (based on case studies), - techniques and Strategies,
Reading - Case Studies, excerpts from literary texts, news reports etc.
Writing – Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay
Grammar – Error correction; If conditional sentences
Vocabulary - Compound Words, Sentence Completion.

UNIT IV REPORTING OF EVENTS AND RESEARCH 12

Listening – Listening Comprehension based on news reports – and documentaries – Precis writing, Summarising, Speaking – Interviewing, Presenting an oral report, Mini presentations on select

topics;
Reading –Newspaper articles; Writing – Recommendations, Transcoding, Accident Report, Survey Report Grammar – Reported Speech, Modals Vocabulary – Conjunctions- use of prepositions

UNIT V THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY 12

Listening – Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance);
Speaking – Participating in a Role play, (interview/telephone interview), virtual interviews, Making presentations with visual aids;
Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses Vocabulary – Idioms.

TOTAL : 60

PERIODS COURSE OUTCOMES:

At the end of the course, learners will be able

- To compare and contrast products and ideas in technical texts.
- To identify cause and effects in events, industrial processes through technical texts
- To analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.
- To report events and the processes of technical and industrial nature.
- To present their opinions in a planned and logical manner, and draft effective resumes in context of job search.

TEXTBOOK

1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University.
2. English for Science & Technology Cambridge University Press 2021.Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd.
1990, Delhi.

MA3251 STATISTICS AND NUMERICAL METHODS L T P C

3 1 0 4

COURSE OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.

- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 9+3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS 9+3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9+3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical
single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.

TOTAL: 60 PERIODS

COURSE OUTCOMES

Upon successful completion of the course, students will be able to:

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.
- Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10^{th} Edition, New Delhi, 2015.

2. Johnson, R.A., Miller, I and Freund J., “Miller and Freund’s Probability and Statistics for

Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES
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1. Burden, R.L and Faires, J.D, "Numerical Analysis”, 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences”, Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis” Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., “Fundamentals of Mathematical Statistics”, Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum’s Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., “Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

PH3251 MATERIALS SCIENCE L T P C

3 0 0 3

COURSE OBJECTIVES:

- To make the students to understand the basics of crystallography and its importance in studying materials properties.
- To understand the electrical properties of materials including free electron theory, applications of quantum mechanics and magnetic materials.
- To instil knowledge on physics of semiconductors, determination of charge carriers and device applications
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications
- To inculcate an idea of significance of nano structures, quantum confinement and ensuing nano device applications.

UNIT CRYSTALLOGRAPHY 9

Crystal structures: BCC, FCC and HCP – directions and planes - linear and planar densities – crystal imperfections- edge and screw dislocations – grain and twin boundaries - Burgers vector and elastic strain energy- Slip systems, plastic deformation of materials - Polymorphism – phase changes – nucleation and growth – homogeneous and heterogeneous nucleation.

UNIT IIELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Quantum free electron theory :Tunneling – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole. Magnetic materials: Dia, para and ferromagnetic effects – paramagnetism in the conduction electrons in metals – exchange interaction and ferromagnetism – quantum interference devices – GMR devices.

UNIT III SEMICONDUCTORS AND TRANSPORT PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors –

Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts
– Schottky diode.

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain. Optical processes in quantum wells – Optoelectronic devices: light detectors and solar cells – light emitting diode – laser diode - optical processes in organic semiconductor devices –excitonic state – Electro-optics and nonlinear optics: Modulators and switching devices – plasmonics.

UNIT V NANOELECTRONIC DEVICES 9

Quantum confinement – Quantum structures – quantum wells, wires and dots – Zener-Bloch oscillations – Resonant tunneling – quantum interference effects - mesoscopic structures - Single electron phenomena – Single electron Transistor. Semiconductor photonic structures – 1D, 2D and 3D photonic crystal. Active and passive optoelectronic devices – photo processes – spintronics – carbon nanotubes: Properties and applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to

- know basics of crystallography and its importance for varied materials properties
- gain knowledge on the electrical and magnetic properties of materials and their applications
- understand clearly of semiconductor physics and functioning of semiconductor devices
- understand the optical properties of materials and working principles of various optical devices
- appreciate the importance of functional nanoelectronic devices

TEXT BOOKS:

1. V.Raghavan. Materials Science and Engineering: A First Course, Prentice Hall India Learning Private Limited, 2015.
2. S.O. Kasap, Principles of Electronic Materials and Devices, Mc-Graw Hill, 2018.
3. Jasprit Singh, Semiconductor Devices: Basic Principles, Wiley (India), 2007.
4. Jasprit Singh, Semiconductor Optoelectronics: Physics and Technology, Mc-Graw Hill India (2019)
5. G.W.Hanson. Fundamentals of Nanoelectronics. Pearson Education (Indian Edition), 2009.

REFERENCES:

1. R.Balasubramaniam, Callister's Materials Science and Engineering. Wiley (Indian Edition), 2014.
2. Wendelin Wright and Donald Askeland, Essentials of Materials Science and Engineering, CL Engineering, 2013.
3. Robert F.Pierret, Semiconductor Device Fundamentals, Pearson, 2006
4. Pallab Bhattacharya, Semiconductor Optoelectronic Devices, Pearson, 2017
5. Ben Rogers, Jesse Adams and Sumita Pennathur, Nanotechnology: Understanding Small Systems, CRC Press, 2017.

BE3251 BASIC ELECTRICAL AND ELECTRONICS **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To introduce the basics of electric circuits and analysis
- To impart knowledge in the basics of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To educate on the fundamental concepts of digital electronics
- To introduce the functional elements and working of measuring instruments

UNIT I ELECTRICAL CIRCUITS 9

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state)

Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only)

UNIT II ELECTRICAL MACHINES 9

Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.

UNIT III ANALOG ELECTRONICS 9

Resistor, Inductor and Capacitor in Electronic Circuits- Semiconductor Materials: Silicon &Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications – Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET,IGBT – Types, I-V Characteristics and Applications, Rectifier and Inverters

UNIT IV DIGITAL ELECTRONICS 9

Review of number systems, binary codes, error detection and correction codes, Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps (Simple Problems only)

UNIT V MEASUREMENTS AND INSTRUMENTATION 9

Functional elements of an instrument, Standards and calibration, Operating Principle, types - Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT, DSO- Block diagram- Data acquisition.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After completing this course, the students will be able to

1. Compute the electric circuit parameters for simple problems
2. Explain the working principle and applications of electrical machines
3. Analyze the characteristics of analog electronic devices
4. Explain the basic concepts of digital electronics
5. Explain the operating principles of measuring instruments

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition,
McGraw Hill Education, 2020
2. S.K.Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.
3. Sedha R.S., "A textbook book of Applied Electronics", S. Chand & Co., 2008
4. James A .Svoboda, Richard C. Dorf, "Dorf's Introduction to Electric Circuits", Wiley, 2018.
5. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.

REFERENCES:

1. Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019.
2. Thomas L. Floyd, 'Digital Fundamentals', 11th Edition, Pearson Education, 2017.
3. Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017.
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
5. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

GE3251	ENGINEERING GRAPHICS	L	T	P	C
		2	0	4	4

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

1. Drawing engineering curves.
2. Drawing freehand sketch of simple objects.
3. Drawing orthographic projection of solids and section of solids.
4. Drawing development of solids
5. Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING

6+12

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 6+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles — Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.

Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6 +12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.

Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12

Principles of isometric projection — isometric scale - lsometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

Practicing three dimensional modeling of isometric projection of simple objects by CAD Software

(Not for examination) **TOTAL: (L=30; P=60) 90 PERIODS**

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

- Use BIS conventions and specifications for engineering drawing.
- Construct the conic curves, involutes and cycloid.
- Solve practical problems involving projection of lines.
- Draw the orthographic, isometric and perspective projections of simple solids.
- Draw the development of simple solids.

TEXT BOOKS:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House,53 Edition, 2019.

2. Natrajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai,2018.
3. Parthasarathy, N. S. and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015

REFERENCES:

1. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, McGraw Hill, 2nd Edition, 2019.
2. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
3. Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. Parthasarathy N. S. and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.
5. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson Education India, 2nd Edition, 2009.
6. Venugopal K. and Prabhu Raja V., “Engineering Graphics", New Age International (P) Limited, 2008.

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM
B.E. AUTOMOBILE ENGINEERING

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

Students will excel in their professional career in automobile industry and research with the highest professional and ethical standards in their activities by acquiring knowledge in basic engineering, mathematics, science and automobile engineering.

Students will exhibit professionalism, team work in their chosen profession and adapt to current trends, technologies and industrial scenarios by pursuing life-long learning.

PROGRAMME OUTCOMES (PO)

Graduates will demonstrate strong basics in Mathematics, Science and Engineering

Graduates will demonstrate the ability to design and conduct experiments, as well as to analyze and interpret data.

Graduates will demonstrate the ability to design a system, component or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

Graduates will become familiar with modern engineering tools and analyse the problems within the domains of Automobile Engineering as members of multidisciplinary teams.

Graduates will acquire the capability to identify, formulate and solve complex engineering problems related to Automobile Engineering.

Graduates will demonstrate an understanding of professional and ethical responsibility with reference to their career in the field of Automobile Engineering.

Graduates will be able to communicate effectively both in verbal and non-verbal forms.

Graduates will be trained towards developing the impact of Automobile engineering in the global, economic environmental and societal contexts.

Graduates will be capable of understanding the value for life-long learning.

Graduates will demonstrate knowledge of contemporary issues focusing on the necessity to develop new material, design, and engineering practice in the field of Automobile Engineering.

Graduates will demonstrate the ability to use the techniques , skills and modern engineering tools necessary for engineering practice in the field of Automobile Engineering.

Graduates will have a firm scientific, technological and communication base that would help them either to find the desired placement or to become an entrepreneur and explore the knowledge in their field.

Graduates will be capable of doing higher studies and research in inter and multi-disciplinary areas.

PEO / PO Mapping

PO / PEO	a	b	c	d	e	f	g	h	i	j	k	l	m
1	□	□	□	□	□	□		□		□	□	□	□
2		□	□	□	□		□		□	□	□	□	□

Semester Course wise PO mapping

		Course Title	a	b	c	d	e	f	g	h	i	j	k	l	m
YEAR I	I SEMESTER	Communicative English	□	□		□		□	□		□	□		□	□
		Engineering Mathematics I	□	□		□	□					□	□	□	□
		Engineering Physics	□	□		□	□					□	□	□	□
		Engineering Chemistry	□	□		□	□					□	□	□	□
		Problem Solving and Python Programming	□	□		□	□					□	□	□	□
		Engineering Graphics	□	□	□	□		□	□	□			□	□	□
		Programming Laboratory	□	□		□	□	□				□	□	□	□
		Physics and Chemistry Laboratory	□	□		□	□					□	□	□	□
	II SEMESTER	Technical English	□	□		□		□			□	□		□	□
		Engineering Mathematics II	□	□		□	□					□	□	□	□
		Materials Science	□	□		□	□					□	□	□	□
		Basic Electrical, Electronics and Instrumentation Engineering	□		□	□	□			□	□		□	□	□
		Environmental Science and Engineering						□		□	□	□			□
		Engineering Mechanics	□	□		□	□		□			□	□	□	□
		Engineering Practices Laboratory		□	□	□			□			□	□	□	
		Basic Electrical, Electronics and Instrumentation Engineering Laboratory	□	□		□	□				□	□	□	□	□
YEAR II	SEMI II	Transforms and Partial Differential Equations	□			□	□		□		□		□		□
		Engineering Thermodynamics	□	□	□	□	□			□	□	□	□		□
		Strength of Materials for Mechanical Engineers	□	□		□	□				□	□		□	□
		Spark Ignition Engines	□				□			□	□	□	□	□	□

		Manufacturing Technology	□	□	□	□	□			□		□	□	□	□
		Fluid Mechanics and Machinery	□			□	□						□	□	□
		Strength of Materials and Fluid Mechanics and Machinery Laboratory	□	□		□	□				□	□	□	□	□
		Computer Aided Machine Drawing	□	□	□	□	□			□	□	□	□	□	□
		Interpersonal Skills/Listening & Speaking	□	□		□		□	□		□	□		□	□
	SEMESTER IV	Statistics and Numerical Methods	□	□			□		□		□		□		□
		Compression Ignition Engines	□				□			□	□	□	□	□	□
		Engineering Metallurgy	□	□	□	□	□			□	□	□	□	□	□
		Electronics and Microprocessors	□	□	□	□	□			□	□	□	□	□	□
		Automotive Chassis Mechanics	□				□			□	□	□	□	□	□
		of Machines	□	□		□	□					□	□	□	□
		Automotive Components Laboratory	□	□	□		□			□	□	□	□	□	□
		Electronics and Microprocessors Laboratory	□	□	□	□	□			□		□	□	□	□
YEAR III	SEMESTER V	Design of Machine Elements	□	□	□		□			□	□	□	□	□	□
		Automotive Transmission	□	□	□		□			□	□	□	□	□	□
		Automotive Electrical and Electronics Systems	□	□	□	□	□			□		□			□
		Vehicle Design Data Characteristics	□	□		□	□			□	□	□	□	□	□
		Automotive Fuels and Lubricants	□	□	□		□	□		□		□			
		Open Elective - I													
		Professional Communication	□	□		□		□	□		□	□		□	□
		Automotive Electrical and Electronics Laboratory	□	□			□			□	□	□	□	□	□
		Automotive Fuels and Lubricants Laboratory	□				□	□		□	□	□	□	□	

	SEMESTER VI	Total Quality Management	□		□	□		□	□	□	□	□	□	□	□
		Automotive Engine Components Design	□	□	□		□					□		□	□
		Automotive Chassis Components Design	□	□	□		□					□		□	□
		Two and Three Wheelers	□			□				□	□	□	□	□	□
		Vehicle Dynamics	□	□	□	□	□			□	□	□			□
		Professional Elective – I													
		Computer Aided Engine and Chassis Design Laboratory	□	□		□	□			□	□	□	□	□	□
		Two and Three Wheelers Laboratory	□	□	□					□	□	□	□	□	□
YEAR IV	SEMESTER VII	Engine and Vehicle Management System	□	□	□	□	□			□	□	□	□	□	□
		Finite Element Analysis	□	□	□	□	□			□	□	□	□	□	□
		Vehicle Maintenance	□		□	□	□	□		□	□		□	□	□
		Open Elective - II													
		Professional Elective – II													
		Professional Elective – III													
		Engine Performance and Emission Testing Laboratory	□	□	□		□			□		□	□		□
		Vehicle Maintenance Laboratory	□	□	□	□				□	□	□	□	□	□
	SEM VIII	Vehicle Body Engineering	□	□	□	□	□			□	□	□	□		□
		Professional Elective – IV													
		Professional Elective – V													
		Project Work	□	□	□	□	□	□	□	□	□	□	□	□	□

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. AUTOMOBILE ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM
I TO VIII SEMESTERS CURRICULA AND SYLLABI

SEMESTER I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	MA8151	Engineering Mathematics - I	BS	4	4	0	0	4
3.	PH8151	Engineering Physics	BS	3	3	0	0	3
4.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
6.	GE8152	Engineering Graphics	ES	6	2	0	4	4
PRACTICALS								
7.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
8.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
			TOTAL	**31**	**19**	**0**	**12**	**25**

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8251	Technical English	HS	4	4	0	0	4
2.	MA8251	Engineering Mathematics - II	BS	4	3	0	0	3
3.	PH8251	Materials Science	BS	3	3	0	0	3
4.	BE8253	Basic Electrical, Electronics and Instrumentation Engineering	ES	3	3	0	0	3
5.	GE8291	Environmental Science and Engineering	HS	3	3	2	0	4
6.	GE8292	Engineering Mechanics	ES	5				
PRACTICALS								
7.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
8.	BE8261	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	ES	4	0	0	4	2
			TOTAL	**30**	**20**	**2**	**8**	**25**

SEMESTER III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
2.	ME8391	Engineering Thermodynamics	PC	5	3	2	0	4
3.	CE8395	Strength of Materials for Mechanical Engineers	ES	3	3	0	0	3
4.	AT8301	Spark Ignition Engines	PC	3	3	0	0	3
5.	ME8392	Manufacturing Technology	PC	3	3	0	0	3
6.	CE8394	Fluid Mechanics and Machinery	ES	4	4	0	0	4
PRACTICAL								
7.	CE8381	Strength of Materials and Fluid Mechanics and Machinery Laboratory	ES	4	0	0	4	2
8.	ME8381	Computer Aided Machine Drawing	PC	4	0	0	4	2
9.	HS8381	Interpersonal Skills/Listening & Speaking	EEC	2	0	0	2	1
			TOTAL	**32**	**20**	**2**	**10**	**26**

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8452	Statistics and Numerical Methods	BS	4	4	0	0	4
2.	AT8401	Compression Ignition Engines	PC	3	3	0	0	3
3.	ME8491	Engineering Metallurgy	PC	3	3	0	0	3
4.	EC8396	Electronics and Microprocessors	ES	3	3	0	0	3
5.	AT8402	Automotive Chassis	PC	3	3	0	0	3
6.	PR8451	Mechanics of Machines	PC	3	3	0	0	3
PRACTICAL								
7.	AT8411	Automotive Components Laboratory	PC	4	0	0	4	2
8.	EC8382	Electronics and Microprocessors Laboratory	ES	4	0	0	4	2
			TOTAL	**27**	**19**	**0**	**10**	**23**

SEMESTER V

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	ME8593	Design of Machine Elements	PC	3	3	0	0	3
2.	AT8501	Automotive Transmission	PC	3	3	0	0	3
3.	AT8502	Automotive Electrical and Electronics Systems	PC	3	3	0	0	3
4.	AT8503	Vehicle Design Data Characteristics	PC	3	3	0	0	3
5.	AT8504	Automotive Fuels and Lubricants	PC	3	3	0	0	3
6.		Open Elective - I	OE	3	3	0	0	3
PRACTICAL								
7.	AT8511	Automotive Electrical and Electronics Laboratory	PC	4	0	0	4	2
8.	AT8512	Automotive Fuels and Lubricants Laboratory	PC	4	0	0	4	2
9.	HS8581	Professional Communication	EEC	2	0	0	2	1
			TOTAL	**28**	**18**	**0**	**10**	**23**

SEMESTER VI

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	GE8077	Total Quality Management	HS	3	3	0	0	3
2.	AT8601	Automotive Engine Components Design	PC	3	3	0	0	3
3.	AT8602	Automotive Chassis Components Design	PC	3	3	0	0	3
4.	AT8603	Two and Three Wheelers	PC	3	3	0	0	3
5.	AT8604	Vehicle Dynamics	PC	3	3	0	0	3
6.		Professional Elective – I	PE	3	3	0	0	3
PRACTICAL								
7.	AT8611	Computer Aided Engine and Chassis Design Laboratory	PC	4	0	0	4	2
8.	AT8612	Two and Three Wheelers Laboratory	PC	4	0	0	4	2
			TOTAL	**26**	**18**	**0**	**8**	**22**

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	AT8701	Engine and Vehicle Management System	PC	3	3	0	0	3
2.	ME8692	Finite Element Analysis	PC	3	3	0	0	3
3.	AT8702	Vehicle Maintenance	PC	3	3	0	0	3
4.		Open Elective - II	OE	3	3	0	0	3
5.		Professional Elective – II	PE	3	3	0	0	3
6.		Professional Elective – III	PE	3	3	0	0	3
PRACTICAL								
7.	AT8711	Engine Performance and Emission Testing Laboratory	PC	4	0	0	4	2
8.	AT8712	Vehicle Maintenance Laboratory	PC	4	0	0	4	2
			TOTAL	**26**	**18**	**0**	**8**	**22**

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	AT8801	Vehicle Body Engineering	PC	3	3	0	0	3
2.		Professional Elective – IV	PE	3	3	0	0	3
3.		Professional Elective – V	PE	3	3	0	0	3
PRACTICAL								
4.	AT8811	Project Work	EEC	20	0	0	20	10
			TOTAL	**29**	**9**	**0**	**20**	**19**

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 185

HUMANITIES AND SOCIAL SCIENCES (HS)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	HS8251	Technical English	HS	4	4	0	0	4
3.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
4.	GE8077	Total Quality Management	HS	3	3	0	0	3

BASIC SCIENCES (BS)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA8151	Engineering Mathematics I	BS	5	3	2	0	4
2.	PH8151	Engineering Physics	BS	3	3	0	0	3
3.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
4.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
5.	MA8251	Engineering Mathematics II	BS	4	4	0	0	4
6.	PH8251	Materials Science	BS	3	3	0	0	3
7.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
8.	MA8452	Statistics and Numerical Methods	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
2.	GE8152	Engineering Graphics	ES	6	2	0	4	4
3.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
4.	BE8253	Basic Electrical, Electronics and Instrumentation Engineering	ES	3	3	0	0	3
5.	GE8292	Engineering Mechanics	ES	5	3	2	0	4
6.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
7.	BE8261	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	ES	4	0	0	4	2
8.	CE8395	Strength of Materials for Mechanical Engineers	ES	3	3	0	0	3
9.	CE8394	Fluid Mechanics and Machinery	ES	4	4	0	0	4
10.	CE8381	Strength of Materials and Fluid Mechanics and Machinery Laboratory	ES	4	0	0	4	2
11.	EC8396	Electronics and Microprocessors	ES	3	3	0	0	3
12.	EC8382	Electronics and Microprocessors Laboratory	ES	4	0	0	4	2

PROFESSIONAL CORE (PC)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
	ME8391	Engineering Thermodynamics	PC	5	3	2	0	4
	AT8301	Spark Ignition Engines	PC	3	3	0	0	3
	ME8392	Manufacturing Technology	PC	3	3	0	0	3
	ME8381	Computer Aided Machine Drawing	PC	4	0	0	4	2
	AT8401	Compression Ignition Engines	PC	3	3	0	0	3
	ME8491	Engineering Metallurgy	PC	3	3	0	0	3
	AT8402	Automotive Chassis	PC	3	3	0	0	3
	PR8451	Mechanics of Machines	PC	3	3	0	0	3
	AT8411	Automotive Components Laboratory	PC	4	0	0	4	2
	ME8593	Design of Machine Elements	PC	3	3	0	0	3
	AT8501	Automotive Transmission	PC	3	3	0	0	3
12.	AT8502	Automotive Electrical and Electronics Systems	PC	3	3	0	0	3
	AT8503	Vehicle Design Data Characteristics	PC	3	3	0	0	3
	AT8504	Automotive Fuels and Lubricants	PC	3	3	0	0	3
15.	AT8511	Automotive Electrical and Electronics Laboratory	PC	4	0	0	4	2
16.	AT8512	Automotive Fuels and Lubricants Laboratory	PC	4	0	0	4	2
17.	AT8601	Automotive Engine Components Design	PC	3	3	0	0	3
18.	AT8602	Automotive Chassis Components Design	PC	3	3	0	0	3
	AT8603	Two and Three Wheelers	PC	3	3	0	0	3
20.	AT8611	Computer Aided Engine and Chassis Design Laboratory	PC	4	0	0	4	2
	AT8612	Two and Three Wheelers Laboratory	PC	4	0	0	4	2
22.	AT8701	Engine and Vehicle Management System	PC	3	3	0	0	3
	ME8692	Finite Element Analysis	PC	3	3	0	0	3
	AT8702	Vehicle Maintenance	PC	3	3	0	0	3
	AT8604	Vehicle Dynamics	PC	3	3	0	0	3
26.	AT8711	Engine Performance and Emission Testing Laboratory	PC	4	0	0	4	2
	AT8712	Vehicle Maintenance Laboratory	PC	4	0	0	4	2
	AT8801	Vehicle Body Engineering	PC	3	3	0	0	3

ELECTIVES FOR B.E. AUTOMOBILE ENGINEERING

SEMESTER VI, ELECTIVE – I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	AT8001	Automotive Air-Conditioning	PE	3	3	0	0	3
2.	AT8002	Advance Theory of IC Engines	PE	3	3	0	0	3
3.	AT8003	Metrology and Measurements for Automobile Engineers	PE	3	3	0	0	3
4.	PR8072	New Product Development	PE	3	3	0	0	3
5.	GE8075	Intellectual Property Rights	PE	3	3	0	0	3
6.	GE8073	Fundamentals of Nanoscience	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE – II

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	AT8091	Manufacturing of Automotive Components	PE	3	3	0	0	3
2.	AT8004	New Generation and Hybrid Vehicles	PE	3	3	0	0	3
3.	AT8005	Automotive Aerodynamics	PE	3	3	0	0	3
4.	AT8006	Off Road Vehicles	PE	3	3	0	0	3
5.	MG8491	Operations Research	PE	3	3	0	0	3
6.	GE8071	Disaster Management	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE – III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	AT8007	Noise, Vibration and Measurements	PE	3	3	0	0	3
2.	PR8071	Lean Six Sigma	PE	3	3	0	0	3
3.	ME8099	Robotics	PE	3	3	0	0	3
4.	ME8092	Composite Materials and Mechanics	PE	3	3	0	0	3
5.	GE8072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3
6.	GE8074	Human Rights	PE	3	3	0	0	3

SEMESTER VIII, ELECTIVE – IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	AT8008	Transport Management	PE	3	3	0	0	3
2.	MG8091	Entrepreneurship Development	PE	3	3	0	0	3
3.	AT8009	Automotive Safety	PE	3	3	0	0	3
4.	AT8010	Automotive Pollution and Control	PE	3	3	0	0	3
5.	AT8011	Automotive Testing	PE	3	3	0	0	3

SEMESTER VIII, ELECTIVE – V

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	PR8491	Computer Integrated Manufacturing	PE	3	3	0	0	3
2.	AT8012	Alternative Fuels and Energy Systems	PE	3	3	0	0	3
3.	MG8591	Principles of Management	PE	3	3	0	0	3
4.	GE8076	Professional Ethics in Engineering	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8381	Interpersonal Skills/Listening and Speaking	EEC	2	0	0	2	1
2.	HS8581	Professional Communication	EEC	2	0	0	2	1
3.	AT8811	Project Work	EEC	20	0	0	20	10

SUMMARY

SL NO	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL	Percentage %
		I	II	III	IV	V	VI	VII	VIII		
1.	**HS**	04	07	00	00	00	03	00	00	14	7.56
2.	**BS**	12	07	04	04	00	00	00	00	27	14.59
3.	**ES**	09	11	09	05	00	00	00	00	34	17.83
4.	**PC**	00	00	12	14	19	16	13	03	77	42.00
5.	**PE**	00	00	00	00	00	03	06	06	15	8.10
6.	**OE**	00	00	00	00	03	00	03	00	06	3.24
7.	**EEC**	00	00	01	00	01	00	00	10	13	7.02
	Total	**25**	**25**	**26**	**23**	**23**	**22**	**22**	**19**	**185**	
8	**Non Credit/ Mandatory**										

		L	T	P	C
HS8151	**COMMUNICATIVE ENGLISH**	**4**	**0**	**0**	**4**

OBJECTIVES:

To develop the basic reading and writing skills of first year engineering and technology students.
To help learners develop their listening skills, which will, enable them listen to lectures and comprehend them by asking questions; seeking clarifications.
To help learners develop their speaking skills and speak fluently in real contexts.
To help learners develop vocabulary of a general kind by developing their reading skills

UNIT I SHARING INFORMATION RELATED TO ONESELF/FAMILY& FRIENDS 12

Reading- short comprehension passages, practice in skimming-scanning and predicting- Writing- completing sentences- - developing hints. Listening- short texts- short formal and informal conversations. Speaking- introducing oneself - exchanging personal information- Language development- Wh- Questions- asking and answering-yes or no questions- parts of speech. Vocabulary development-- prefixes- suffixes- articles.- count/ uncount nouns.

UNIT II GENERAL READING AND FREE WRITING 12

Reading - comprehension-pre-reading-post reading- comprehension questions (multiple choice questions and /or short questions/ open-ended questions)-inductive reading- short narratives and descriptions from newspapers including dialogues and conversations (also used as short Listening texts)- register- Writing – paragraph writing- topic sentence- main ideas- free writing, short narrative descriptions using some suggested vocabulary and structures –Listening- telephonic conversations. Speaking – sharing information of a personal kind—greeting – taking leave- Language development – prepositions, conjunctions Vocabulary development- guessing meanings of words in context.

UNIT III GRAMMAR AND LANGUAGE DEVELOPMENT 12

Reading- short texts and longer passages (close reading) Writing- understanding text structure- use of reference words and discourse markers-coherence-jumbled sentences Listening – listening to longer texts and filling up the table- product description- narratives from different sources. Speaking- asking about routine actions and expressing opinions. Language development- degrees of comparison- pronouns- direct vs indirect questions- Vocabulary development – single word substitutes- adverbs.

UNIT IV READING AND LANGUAGE DEVELOPMENT 12

Reading- comprehension-reading longer texts- reading different types of texts- magazines Writing- letter writing, informal or personal letters-e-mails-conventions of personal email- Listening- listening to dialogues or conversations and completing exercises based on them. Speaking- speaking about oneself- speaking about one,s friend- Language development- Tenses- simple present-simple past-present continuous and past continuous- Vocabulary development- synonyms-antonyms- phrasal verbs

UNIT V EXTENDED WRITING 12

Reading- longer texts- close reading –Writing- brainstorming -writing short essays – developing an outline- identifying main and subordinate ideas- dialogue writing-Listening – listening to talks-conversations- Speaking – participating in conversations- short group conversations-Language development-modal verbs- present/ past perfect tense - Vocabulary development-collocations- fixed and semi-fixed expressions

TOTAL = 60 PERIODS

OUTCOMES:

At the end of the course, learners will be able to:

Read articles of a general kind in magazines and newspapers.

Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.

Comprehend conversations and short talks delivered in English

Write short essays of a general kind and personal letters and emails in English.

TEXT BOOKS:

Board of Editors. Using English A Course book for Undergraduate Engineers and Technologists. Orient Black Swan Limited, Hyderabad: 2015

Richards, C. Jack. Interchange Students, Book-2 New Delhi: CUP, 2015.

REFERENCES

Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge, 2011.

Means,L. Thomas and Elaine Langlois. English & Communication For Colleges. CengageLearning ,USA: 2007

Redston, Chris &Gillies Cunningham Face2Face (Pre-intermediate Student,s Book& Workbook) Cambridge University Press, New Delhi: 2005

Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skillsfor Business English. Cambridge University Press, Cambridge: Reprint 2011

Dutt P. Kiranmai and RajeevanGeeta. Basic Communication Skills, Foundation Books: 2013

MA8151	ENGINEERING MATHEMATICS – I	L	T	P	C
		4	0	0	4

OBJECTIVES :

The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT I DIFFERENTIAL CALCULUS 12

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12

Partial differentiation – Homogeneous functions and Euler,s theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor,s series for functions of two variables – Maxima and minima of functions of two variables – Lagrange,s method of undetermined multipliers.

UNIT III INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

UNIT V DIFFERENTIAL EQUATIONS 12

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler,s and Legendre,s type – System of simultaneous linear differential equations with constant coefficients - Method of undetermined coefficients.

TOTAL : 60 PERIODS

OUTCOMES :

After completing this course, students should demonstrate competency in the following skills:

Use both the limit definition and rules of differentiation to differentiate functions.

Apply differentiation to solve maxima and minima problems.

Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.

Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.

Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.

Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.

Apply various techniques in solving differential equations.

TEXT BOOKS :

Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.

James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015. [For Units I & III - Sections 1.1, 2.2, 2.3, 2.5, 2.7(Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1(Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :

Anton, H, Bivens, I and Davis, S, "Calculus", Wiley, 10th Edition, 2016.

Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 3rd Edition, 2007.

3. Narayanan, S. and Manicavachagom Pillai, T. K., “Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.

Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.

Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016.

PH8151	ENGINEERING PHYSICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I PROPERTIES OF MATTER 9

Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT II WAVES AND FIBER OPTICS 9

Oscillatory motion – forced and damped oscillations: differential equation and its solution – plane progressive waves – wave equation. Lasers : population of energy levels, Einstein,s A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – losses associated with optical fibers - fibre optic sensors: pressure and displacement.

UNIT III THERMAL PHYSICS 9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conduction, convection and radiation – heat conductions in solids – thermal conductivity - Forbe,s and Lee,s disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT IV QUANTUM PHYSICS 9

Black body radiation – Planck,s theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger,s wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunnelling (qualitative) - scanning tunnelling microscope.

UNIT V CRYSTAL PHYSICS 9

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults – role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course,

the students will gain knowledge on the basics of properties of matter and its applications,

the students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,

the students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,

the students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and

the students will understand the basics of crystals, their structures and different crystal growth techniques.

TEXT BOOKS:

Bhattacharya, D.K. & Poonam, T. “Engineering Physics”. Oxford University Press, 2015.

Gaur, R.K. & Gupta, S.L. “Engineering Physics”. Dhanpat Rai Publishers, 2012.

Pandey, B.K. & Chaturvedi, S. “Engineering Physics”. Cengage Learning India, 2012.

REFERENCES:

Halliday, D., Resnick, R. & Walker, J. “Principles of Physics”. Wiley, 2015.

Serway, R.A. & Jewett, J.W. “Physics for Scientists and Engineers”. Cengage Learning, 2010.

Tipler, P.A. & Mosca, G. “Physics for Scientists and Engineers with Modern Physics,. W.H.Freeman, 2007.

CY8151 ENGINEERING CHEMISTRY L T P C

3 0 0 3

OBJECTIVES:

To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.

To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.

Preparation, properties and applications of engineering materials.

Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT I WATER AND ITS TREATMENT 9

Hardness of water – types – expression of hardness – units – estimation of hardness of water by EDTA – numerical problems – boiler troubles (scale and sludge) – treatment of boiler feed water – Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) external treatment – Ion exchange process, zeolite process – desalination of brackish water - Reverse Osmosis.

UNIT II SURFACE CHEMISTRY AND CATALYSIS 9

Adsorption: Types of adsorption – adsorption of gases on solids – adsorption of solute from solutions – adsorption isotherms – Freundlich,s adsorption isotherm – Langmuir,s adsorption isotherm – contact theory – kinetics of surface reactions, unimolecular reactions, Langmuir - applications of adsorption on pollution abatement.

Catalysis: Catalyst – types of catalysis – criteria – autocatalysis – catalytic poisoning and catalytic promoters - acid base catalysis – applications (catalytic convertor) – enzyme catalysis– Michaelis – Menten equation.

UNIT III ALLOYS AND PHASE RULE 9

Alloys: Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Nichrome and stainless steel (18/8) – heat treatment of steel. Phase rule: Introduction, definition of terms with examples, one component system -water system - reduced phase rule - thermal analysis and cooling curves - two component systems - lead-silver system - Pattinson process.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - manufacture of synthetic petrol (Bergius process) - knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - power alcohol and biodiesel. Combustion of fuels: Introduction - calorific value - higher and lower calorific values- theoretical calculation of calorific value - ignition temperature - spontaneous ignition temperature - explosive range - flue gas analysis (ORSAT Method).

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant - breeder reactor - solar energy conversion - solar cells - wind energy. Batteries, fuel cells and supercapacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells – H_2-O_2 fuel cell.

TOTAL: 45 PERIODS

OUTCOMES:

The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

S. S. Dara and S. S. Umare, “A Textbook of Engineering Chemistry”, S. Chand & Company LTD, New Delhi, 2015

P. C. Jain and Monika Jain, “Engineering Chemistry” Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015

S. Vairam, P. Kalyani and Suba Ramesh, “Engineering Chemistry”, Wiley India PVT, LTD, New Delhi, 2013.

REFERENCES:

Friedrich Emich, “Engineering Chemistry”, Scientific International PVT, LTD, New Delhi, 2014.

Prasanta Rath, “Engineering Chemistry”, Cengage Learning India PVT, LTD, Delhi, 2015.

Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, 2015.

GE8151 PROBLEM SOLVING AND PYTHON PROGRAMMING LTPC

3 0 0 3

OBJECTIVES:

To know the basics of algorithmic problem solving

To read and write simple Python programs.

To develop Python programs with conditionals and loops.

To define Python functions and call them.

To use Python data structures –- lists, tuples, dictionaries.

To do input/output with files in Python.

UNIT I ALGORITHMIC PROBLEM SOLVING 9

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT V FILES, MODULES, PACKAGES 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

OUTCOMES:

Upon completion of the course, students will be able to

Develop algorithmic solutions to simple computational problems
Read, write, execute by hand simple Python programs.
Structure simple Python programs for solving problems.
Decompose a Python program into functions.
Represent compound data using Python lists, tuples, dictionaries.
Read and write data from/to files in Python Programs.

TOTAL : 45 PERIODS

TEXT BOOKS:

Allen B. Downey, ‘‘Think Python: How to Think Like a Computer Scientist,,, 2nd edition, Updated for Python 3, Shroff/O,Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

Guido van Rossum and Fred L. Drake Jr, “An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

John V Guttag, “Introduction to Computation and Programming Using Python,,, Revised and expanded Edition, MIT Press , 2013

Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.

Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd.,, 2015.

Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.

Charles Dierbach, “Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.

Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3”, Second edition, Pragmatic Programmers, LLC, 2013.

GE8152 ENGINEERING GRAPHICS L T P C
2044

OBJECTIVES:

To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.

To expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination) 1

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING 7+12

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 5+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 5+12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method .

TOTAL: 90 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

familiarize with the fundamentals and standards of Engineering graphics

perform freehand sketching of basic geometrical constructions and multiple views of objects.

project orthographic projections of lines and plane surfaces.

draw projections and solids and development of surfaces.

visualize and to project isometric and perspective sections of simple solids.

TEXT BOOKS:

Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

REFERENCES:

Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.

Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.

Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

N. S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.

Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.

Publication of Bureau of Indian Standards:

IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.

IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.

IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.

IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.

IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

There will be five questions, each of either or type covering all units of the syllabus.

All questions will carry equal marks of 20 each making a total of 100.

The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.

The examination will be conducted in appropriate sessions on the same day

GE8161 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY **L T P C 0 0 4 2**

OBJECTIVES:

To write, test, and debug simple Python programs.
To implement Python programs with conditionals and loops.
Use functions for structuring Python programs.
Represent compound data using Python lists, tuples, dictionaries.
Read and write data from/to files in Python.

LIST OF PROGRAMS

Compute the GCD of two numbers.
Find the square root of a number (Newton,s method)
Exponentiation (power of a number)
Find the maximum of a list of numbers
Linear search and Binary search
Selection sort, Insertion sort
Merge sort
First n prime numbers
Multiply matrices
Programs that take command line arguments (word count)
Find the most frequent words in a text read from a file
Simulate elliptical orbits in Pygame
Simulate bouncing ball using Pygame

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

COURSE OUTCOMES:

Upon completion of the course, students will be able to

Write, test, and debug simple Python programs.
Implement Python programs with conditionals and loops.
Develop Python programs step-wise by defining functions and calling them.
Use Python lists, tuples, dictionaries for representing compound data.
Read and write data from/to files in Python.

TOTAL :60 PERIODS

BS8161	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	C
	(Common to all branches of B.E. / B.Tech Programmes)	0	0	4	2

OBJECTIVES:

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

Determination of rigidity modulus – Torsion pendulum

Determination of Young,s modulus by non-uniform bending method

(a) Determination of wavelength, and particle size using Laser

(b) Determination of acceptance angle in an optical fiber.

Determination of thermal conductivity of a bad conductor – Lee,s Disc method.

Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer

Determination of wavelength of mercury spectrum – spectrometer grating

Determination of band gap of a semiconductor

Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

apply principles of elasticity, optics and thermal properties for engineering applications.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:

To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

- To acquaint the students with the determination of molecular weight of a polymer by viscometery.

Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.

Determination of total, temporary & permanent hardness of water by EDTA method.

Determination of DO content of water sample by Winkler,s method.

Determination of chloride content of water sample by argentometric method.

Estimation of copper content of the given solution by Iodometry.

Determination of strength of given hydrochloric acid using pH meter.

Determination of strength of acids in a mixture of acids using conductivity meter.

Estimation of iron content of the given solution using potentiometer.

Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).

Estimation of sodium and potassium present in water using flame photometer.

Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

Pseudo first order kinetics-ester hydrolysis.

Corrosion experiment-weight loss method.

Determination of CMC.

Phase change in a solid.

Conductometric titration of strong acid vs strong base.

TOTAL: 30 PERIODS

OUTCOMES:

The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

TEXT BOOK:

1. Vogel,s Textbook of Quantitative Chemical Analysis (8^{TH} edition, 2014)

HS8251	TECHNICAL ENGLISH	L	T	P	C
		4	0	0	4

OBJECTIVES:

The Course prepares second semester engineering and Technology students to:

Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.

Foster their ability to write convincing job applications and effective reports.

Develop their speaking skills to make technical presentations , participate in group discussions.

Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialisation.

UNIT I INTRODUCTION TECHNICAL ENGLISH 12

Listening- Listening to talks mostly of a scientific/technical nature and completing information-gap exercises- Speaking – Asking for and giving directions- Reading – reading short technical texts from journals- newspapers - Writing- purpose statements – extended definitions – issue- writing instructions – checklists-recommendations-Vocabulary Development- technical vocabulary Language Development –subject verb agreement - compound words.

UNIT II READING AND STUDY SKILLS 12

Listening- Listening to longer technical talks and completing exercises based on them-Speaking – describing a process-Reading – reading longer technical texts- identifying the various transitions in a text- paragraphing- Writing- interpreting charts, graphs- Vocabulary Development-vocabulary used in formal letters/emails and reports Language Development- impersonal passive voice, numerical adjectives.

UNIT III TECHNICAL WRITING AND GRAMMAR 12

Listening- Listening to classroom lectures/ talkls on engineering/technology -Speaking – introduction to technical presentations- Reading – longer texts both general and technical, practice in speed reading; Writing-Describing a process, use of sequence words- Vocabulary Development- sequence words- Misspelled words. Language Development- embedded sentences

UNIT IV REPORT WRITING 12

Listening- Listening to documentaries and making notes. Speaking – mechanics of presentations- Reading – reading for detailed comprehension- Writing- email etiquette- job application – cover letter –Résumé preparation(via email and hard copy)- analytical essays and issue based essays--Vocabulary Development- finding suitable synonyms-paraphrasing-. Language Development-clauses-if conditionals.

UNIT V GROUP DISCUSSION AND JOB APPLICATIONS 12

Listening- TED/Ink talks; Speaking –participating in a group discussion -Reading– reading and understanding technical articles Writing– Writing reports- minutes of a meeting- accident and survey- Vocabulary Development- verbal analogies Language Development- reported speech

TOTAL : 60 PERIODS

OUTCOMES: At the end of the course learners will be able to:

Read technical texts and write area- specific texts effortlessly.
Listen and comprehend lectures and talks in their area of specialisation successfully.
Speak appropriately and effectively in varied formal and informal contexts.
Write reports and winning job applications.

TEXT BOOKS:

Board of editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016
Sudharshana.N.P and Saveetha. C. English for Technical Communication. Cambridge University Press: New Delhi, 2016.

REFERENCES

Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice.Oxford University Press: New Delhi,2014.
Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015
Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007

Students can be asked to read Tagore, Chetan Bhagat and for supplementary reading.

MA8251 ENGINEERING MATHEMATICS – II L T P C
4 0 0 4

OBJECTIVES :

This course is designed to cover topics such as Matrix Algebra, Vector Calculus, Complex Analysis and Laplace Transform. Matrix Algebra is one of the powerful tools to handle practical problems arising in the field of engineering. Vector calculus can be widely used for modelling the various laws of physics. The various methods of complex analysis and Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT I MATRICES 12

Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II VECTOR CALCULUS 12

Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green,s, Gauss divergence and Stoke,s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTIONS **12**

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $w = z + c$, cz, $\frac{1}{z}$,z_2 - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION **12**

Line integral - Cauchy,s integral theorem – Cauchy,s integral formula – Taylor,s and Laurent,s series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour.

UNIT V LAPLACE TRANSFORMS **12**

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

TOTAL: 60 PERIODS

OUTCOMES :

After successfully completing the course, the student will have a good understanding of the following topics and their applications:

Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.

Gradient, divergence and curl of a vector point function and related identities.

Evaluation of line, surface and volume integrals using Gauss, Stokes and Green,s theorems and their verification.

Analytic functions, conformal mapping and complex integration.

Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

TEXT BOOKS :

1. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2016.

REFERENCES :

Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.

Jain R.K. and Iyengar S.R.K., “ Advanced Engineering Mathematics ”, Narosa Publications, New Delhi , 3rd Edition, 2007.

3. O,Neil, P.V. “Advanced Engineering Mathematics”, Cengage Learning India Pvt., Ltd, New Delhi, 2007.
4. Sastry, S.S, “Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.

Wylie, R.C. and Barrett, L.C., “Advanced Engineering Mathematics “Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

		L	T	P	C
PH8251	**MATERIALS SCIENCE** (Common to courses offered in Faculty of Mechanical Engineering Except B.E. Materials Science and Engineering)	**3**	**0**	**0**	**3**

OBJECTIVES:

To introduce the essential principles of materials science for mechanical and related engineering applications.

UNIT I PHASE DIAGRAMS 9

Solid solutions - Hume Rothery's rules – the phase rule - single component system - one-component system of iron - binary phase diagrams - isomorphous systems - the tie-line rule - the lever rule - application to isomorphous system - eutectic phase diagram - peritectic phase diagram - other invariant reactions – free energy composition curves for binary systems - microstructural change during cooling.

UNIT II FERROUS ALLOYS 9

The iron-carbon equilibrium diagram - phases, invariant reactions - microstructure of slowly cooled steels - eutectoid steel, hypo and hypereutectoid steels - effect of alloying elements on the Fe-C system - diffusion in solids - Fick's laws - phase transformations - T-T-T-diagram for eutectoid steel – pearlitic, baintic and martensitic transformations - tempering of martensite – steels – stainless steels – cast irons.

UNIT III MECHANICAL PROPERTIES 9

Tensile test - plastic deformation mechanisms - slip and twinning - role of dislocations in slip - strengthening methods - strain hardening - refinement of the grain size - solid solution strengthening - precipitation hardening - creep resistance - creep curves - mechanisms of creep - creep-resistant materials - fracture - the Griffith criterion - critical stress intensity factor and its determination - fatigue failure - fatigue tests - methods of increasing fatigue life - hardness - Rockwell and Brinell hardness - Knoop and Vickers microhardness.

UNIT IV MAGNETIC, DIELECTRIC AND SUPERCONDUCTING MATERIALS 9

Ferromagnetism – domain theory – types of energy – hysteresis – hard and soft magnetic materials – ferrites - dielectric materials – types of polarization – Langevin-Debye equation – frequency effects on polarization - dielectric breakdown – insulating materials – Ferroelectric materials - superconducting materials and their properties.

UNIT V NEW MATERIALS 9

Ceramics – types and applications – composites: classification, role of matrix and reinforcement, processing of fiber reinforced plastics – metallic glasses: types , glass forming ability of alloys, melt spinning process, applications - shape memory alloys: phases, shape memory effect, pseudoelastic effect, NiTi alloy, applications – nanomaterials: preparation (bottom up and top down approaches), properties and applications – carbon nanotubes: types.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course,

the students will have knowledge on the various phase diagrams and their applications

the students will acquire knowledge on Fe-Fe_3C phase diagram, various microstructures and alloys

the students will get knowledge on mechanical properties of materials and their measurement

the students will gain knowledge on magnetic, dielectric and superconducting properties of materials

the students will understand the basics of ceramics, composites and nanomaterials.

TEXT BOOKS:

Balasubramaniam, R. “Callister’s Materials Science and Engineering”. Wiley India Pvt. Ltd., 2014.

Raghavan, V. “Physical Metallurgy: Principles and Practice”. PHI Learning, 2015.

Raghavan, V. “Materials Science and Engineering : A First course”. PHI Learning, 2015.

REFERENCES

Askeland, D. “Materials Science and Engineering”. Brooks/Cole, 2010.

Smith, W.F., Hashemi, J. & Prakash, R. “Materials Science and Engineering”. Tata McGraw Hill Education Pvt. Ltd., 2014.

Wahab, M.A. “Solid State Physics: Structure and Properties of Materials”, Narosa Publishing House, 2009.

BE8253 BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING **L T P C 3 0 0 3**

OBJECTIVES:

To impart knowledge on

Electric circuit laws, single and three phase circuits and wiring

Working principles of Electrical Machines

Working principle of Various electronic devices and measuring instruments

UNIT I ELECTRICAL CIRCUITS **9**

Basic circuit components - Ohms Law - Kirchoff,s Law – Instantaneous Power – Inductors - Capacitors – Independent and Dependent Sources - steady state solution of DC circuits - Nodal analysis, Mesh analysis- Thevinin,s Theorem, Norton,s Theorem, Maximum Power transfer theorem- Linearity and Superposition Theorem.

UNIT II AC CIRCUITS **9**

Introduction to AC circuits – waveforms and RMS value – power and power factor, single phase and three-phase balanced circuits – Three phase loads - housing wiring, industrial wiring, materials of wiring

UNIT III ELECTRICAL MACHINES **9**

Principles of operation and characteristics of ; DC machines, Transformers (single and three phase) ,Synchronous machines , three phase and single phase induction motors.

UNIT IV ELECTRONIC DEVICES & CIRCUITS **9**

Types of Materials – Silicon & Germanium- N type and P type materials – PN Junction –Forward and Reverse Bias –Semiconductor Diodes –Bipolar Junction Transistor – Characteristics – Field Effect Transistors – Transistor Biasing –Introduction to operational Amplifier –Inverting Amplifier –Non Inverting Amplifier –DAC – ADC .

UNIT V MEASUREMENTS & INSTRUMENTATION **9**

Introduction to transducers - Classification of Transducers: Resistive, Inductive, Capacitive, Thermoelectric, piezoelectric, photoelectric, Hall effect and Mechanical - ,Classification of instruments

Types of indicating Instruments - multimeters –Oscilloscopes- – three-phase power measurements– instrument transformers (CT and PT)

TOTAL : 45 PERIODS

OUTCOMES:

Ability to

Understand electric circuits and working principles of electrical machines
Understand the concepts of various electronic devices
Choose appropriate instruments for electrical measurement for a specific application

TEXT BOOKS

Leonard S Bobrow, " Foundations of Electrical Engineering", Oxford University Press, 2013

D P Kothari and I.J Nagarath, "Electrical Machines "Basic Electrical and Electronics Engineering", McGraw Hill Education(India) Private Limited, Third Reprint ,2016

Thereja .B.L., "Fundamentals of Electrical Engineering and Electronics", S. Chand & Co. Ltd., 2008

REFERENCES

Del Toro, "Electrical Engineering Fundamentals", Pearson Education, New Delhi, 2007

John Bird, "Electrical Circuit Theory and Technology", Elsevier, First Indian Edition, 2006

Allan S Moris, "Measurement and Instrumentation Principles", Elseveir, First Indian Edition, 2006

Rajendra Prasad, "Fundamentals of Electrical Engineering", Prentice Hall of India, 2006

A.E.Fitzgerald, David E Higginbotham and Arvin Grabel, "Basic Electrical Engineering", McGraw Hill Education(India) Private Limited, 2009

N K De, Dipu Sarkar, "Basic Electrical Engineering",Universities Press (India)Private Limited 2016

GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

To study the nature and facts about environment.

To finding and implementing scientific, technological, economic and political solutions to environmental problems.

To study the interrelationship between living organism and environment.

To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.

To study the dynamic processes and understand the features of the earth‟s interior and surface.

To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

Public awareness of environmental is at infant stage.

Ignorance and incomplete knowledge has lead to misconceptions

Development and improvement in std. of living has lead to serious environmental disasters

TEXT BOOKS:

Benny Joseph, ˆEnvironmental Science and Engineering,, Tata McGraw-Hill, New Delhi, 2006.

Gilbert M.Masters, ˆIntroduction to Environmental Engineering and Science,, 2nd edition, Pearson Education, 2004.

REFERENCES :

Dharmendra S. Sengar, ˆEnvironmental law,, Prentice hall of India PVT LTD,New Delhi, 2007.

Erach Bharucha, “Textbook of Environmental Studies”, Universities Press(I) PVT, LTD, Hydrabad, 2015.

Rajagopalan, R, ˆEnvironmental Studies-From Crisis to Cure,, Oxford University Press, 2005.

G. Tyler Miller and Scott E. Spoolman, “Environmental Science”, Cengage Learning India PVT, LTD, Delhi, 2014.

GE8292	ENGINEERING MECHANICS	L	T	P	C
		3	2	0	4

OBJECTIVES:

To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

UNIT I STATICS OF PARTICLES 9+6

Introduction – Units and Dimensions – Laws of Mechanics – Lami,s theorem, Parallelogram and triangular Law of forces – Vectorial representation of forces – Vector operations of forces -additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility .

UNIT II EQUILIBRIUM OF RIGID BODIES 9+6

Free body diagram – Types of supports –Action and reaction forces –stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon,s theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions

UNIT III PROPERTIES OF SURFACES AND SOLIDS 9+6

Centroids and centre of mass – Centroids of lines and areas - Rectangular, circular, triangular areas by integration – T section, I section, - Angle section, Hollow section by using standard formula – Theorems of Pappus - Area moments of inertia of plane areas – Rectangular, circular, triangular areas by integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Principal moments of inertia of plane areas – Principal axes of inertia-Mass moment of inertia –mass moment of inertia for prismatic, cylindrical and spherical solids from first principle – Relation to area moments of inertia.

UNIT IV DYNAMICS OF PARTICLES 9+6

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion - Newton,s laws of motion – Work Energy Equation– Impulse and Momentum – Impact of elastic bodies.

UNIT V FRICTION AND RIGID BODY DYNAMICS 9+6

Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction – wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

TOTAL : 45+30=75 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

illustrate the vectorial and scalar representation of forces and moments
analyse the rigid body in equilibrium
evaluate the properties of surfaces and solids
calculate dynamic forces exerted in rigid body
determine the friction and the effects by the laws of friction

TEXT BOOKS:

Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
Vela Murali, "Engineering Mechanics", Oxford University Press (2010)

REFERENCES:

Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers, 1998.
Hibbeller, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education 2010.
Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4th Edition, Pearson Education 2006.
Meriam J.L. and Kraige L.G., " Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2", Third Edition, John Wiley & Sons,1993.
Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.

GE8261 ENGINEERING PRACTICES LABORATORY L T P C
0 0 4 2

OBJECTIVES:

To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE 13

Buildings:

Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
Study of pipe connections requirements for pumps and turbines.
Preparation of plumbing line sketches for water supply and sewage works.
Hands-on-exercise:
Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

Study of the joints in roofs, doors, windows and furniture.

Hands-on-exercise:

Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE 18

Welding:

(a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.

(b) Gas welding practice

Basic Machining:

Simple Turning and Taper turning

Drilling Practice

Sheet Metal Work:

Forming & Bending:

Model making – Trays and funnels.

Different type of joints.

Machine assembly practice:

Study of centrifugal pump

Study of air conditioner

Demonstration on:

Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.

Foundry operations like mould preparation for gear and step cone pulley.

Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 13

Residential house wiring using switches, fuse, indicator, lamp and energy meter.

Fluorescent lamp wiring.

Stair case wiring

Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.

Measurement of energy using single phase energy meter.

Measurement of resistance to earth of an electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE 16

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.

Study of logic gates AND, OR, EX-OR and NOT.

Generation of Clock Signal.

Soldering practice – Components Devices and Circuits – Using general purpose PCB.

Measurement of ripple factor of HWR and FWR.

TOTAL: 60 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

fabricate carpentry components and pipe connections including plumbing works.

use welding equipments to join the structures.

Carry out the basic machining operations
Make the models using sheet metal works
Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings
Carry out basic home electrical works and appliances
Measure the electrical quantities
Elaborate on the components, gates, soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	15 Sets.
2. Carpentry vice (fitted to work bench)	15 Nos.
3. Standard woodworking tools	15 Sets.
4. Models of industrial trusses, door joints, furniture joints	5 each
5. Power Tools: (a) Rotary Hammer	2 Nos
(b) Demolition Hammer	2 Nos
(c) Circular Saw	2 Nos
(d) Planer	2 Nos
(e) Hand Drilling Machine	2 Nos
(f) Jigsaw	2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders	5 Nos.
2. Welding booth with exhaust facility	5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos.
5. Centre lathe	2 Nos.
6. Hearth furnace, anvil and smithy tools	2 Sets.
7. Moulding table, foundry tools	2 Sets.
8. Power Tool: Angle Grinder	2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner	One each.

ELECTRICAL

1. Assorted electrical components for house wiring	15 Sets
2. Electrical measuring instruments	10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp	1 each
4. Megger (250V/500V)	1 No.
5. Power Tools: (a) Range Finder	2 Nos
(b) Digital Live-wire detector	2 Nos

ELECTRONICS

1. Soldering guns	10 Nos.
2. Assorted electronic components for making circuits	50 Nos.
3. Small PCBs	10 Nos.
4. Multimeters	10 Nos.
Study purpose items: Telephone, FM radio, low-voltage power supply	

BE8261 BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY **LTPC 0 042**

OBJECTIVE:

To train the students in performing various tests on electrical drives, sensors and circuits.

LIST OF EXPERIMENTS:

Load test on separately excited DC generator
Load test on Single phase Transformer
Load test on Induction motor
Verification of Circuit Laws
Verification of Circuit Theorems
Measurement of three phase power
Load test on DC shunt motor.
Diode based application circuits
Transistor based application circuits
Study of CRO and measurement of AC signals
Characteristics of LVDT
Calibration of Rotometer
RTD and Thermistor

Minimum of 10 Experiments to be carried out :-

TOTAL: 60 PERIODS

OUTCOMES:

Ability to determine the speed characteristic of different electrical machines
Ability to design simple circuits involving diodes and transistors
Ability to use operational amplifiers

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	D. C. Motor Generator Set	2
2	D.C. Shunt Motor	2
3	Single Phase Transformer	2
4	Single Phase Induction Motor	2
5	Ammeter A.C and D.C	20
6	Voltmeters A.C and D.C	20
7.	Watt meters LPF and UPF	4
8.	Resistors & Breadboards	-
9.	Cathode Ray Oscilloscopes	4
10.	Dual Regulated power supplies	6
11.	A.C. Signal Generators	4
12.	Transistors (BJT, JFET)	-

MA8353 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C
4 0 0 4

OBJECTIVES :

To introduce the basic concepts of PDE for solving standard partial differential equations.

To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.

To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.

To acquaint the student with Fourier transform techniques used in wide variety of situations.

To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations – Singular integrals - Solutions of standard types of first order partial differential equations - Lagrange,s linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT II FOURIER SERIES 12

Dirichlet,s conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier series – Parseval,s identity – Harmonic analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 12

Classification of PDE – Method of separation of variables - Fourier Series Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT IV FOURIER TRANSFORMS 12

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval,s identity.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 12

Z-transforms - Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL : 60 PERIODS

OUTCOMES :

Upon successful completion of the course, students should be able to:

Understand how to solve the given standard partial differential equations.

Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.

Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.

Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

TEXT BOOKS :

Grewal B.S., “Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.

Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.

REFERENCES :

B.V Ramana.., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.

Erwin Kreyszig, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, India, 2016.

G. James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

L.C Andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SPIE Press, 1999.

N.P. Bali. and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Edition, Laxmi Publications Pvt. Ltd, 2014.

R.C. Wylie, and Barrett, L.C., “Advanced Engineering Mathematics “Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

ME8391 ENGINEERING THERMODYNAMICS LTPC

3 2 0 4

OBJECTIVE:

To familiarize the students to understand the fundamentals of thermodynamics and to perform thermal analysis on their behavior and performance.

(Use of Standard and approved Steam Table, Mollier Chart, Compressibility Chart and Psychrometric Chart permitted)

UNIT I BASIC CONCEPTS AND FIRST LAW 9+6

Basic concepts - concept of continuum, comparison of microscopic and macroscopic approach. Path and point functions. Intensive and extensive, total and specific quantities. System and their types. Thermodynamic Equilibrium State, path and process. Quasi-static, reversible and irreversible processes. Heat and work transfer, definition and comparison, sign convention. Displacement work and other modes of work .P-V diagram. Zeroth law of thermodynamics – concept of temperature and thermal equilibrium– relationship between temperature scales –new temperature scales. First law of thermodynamics –application to closed and open systems – steady and unsteady flow processes.

UNIT II SECOND LAW AND AVAILABILITY ANALYSIS 9+6

Heat Reservoir, source and sink. Heat Engine, Refrigerator, Heat pump. Statements of second law and its corollaries. Carnot cycle Reversed Carnot cycle, Performance. Clausius inequality. Concept of entropy, T-s diagram, Tds Equations, entropy change for - pure substance, ideal gases - different processes, principle of increase in entropy. Applications of II Law. High and low grade energy. Available and non-available energy of a source and finite body. Energy and irreversibility.

Expressions for the energy of a closed system and open systems. Energy balance and entropy generation. Irreversibility. I and II law Efficiency.

UNIT III PROPERTIES OF PURE SUBSTANCE AND STEAM POWER CYCLE 9+6

Formation of steam and its thermodynamic properties, p-v, p-T, T-v, T-s, h-s diagrams. p-v-T surface. Use of Steam Table and Mollier Chart. Determination of dryness fraction. Application of I and II law for pure substances. Ideal and actual Rankine cycles, Cycle Improvement Methods - Reheat and Regenerative cycles, Economiser, preheater, Binary and Combined cycles.

UNIT IV IDEAL AND REAL GASES, THERMODYNAMIC RELATIONS 9+6

Properties of Ideal gas- Ideal and real gas comparison- Equations of state for ideal and real gases- Reduced properties. Compressibility factor-.Principle of Corresponding states. -Generalised Compressibility Chart and its use-. Maxwell relations, Tds Equations, Difference and ratio of heat capacities, Energy equation, Joule-Thomson Coefficient, Clausius Clapeyron equation, Phase Change Processes. Simple Calculations.

UNIT V GAS MIXTURES AND PSYCHROMETRY 9+6

Mole and Mass fraction, Dalton,s and Amagat,s Law. Properties of gas mixture – Molar mass, gas constant, density, change in internal energy, enthalpy, entropy and Gibbs function. Psychrometric properties, Psychrometric charts. Property calculations of air vapour mixtures by using chart and expressions. Psychrometric process – adiabatic saturation, sensible heating and cooling, humidification, dehumidification, evaporative cooling and adiabatic mixing. Simple Applications

TOTAL : 75 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.

CO2 Apply second law of thermodynamics to open and closed systems and calculate entropy and availability.

CO3 Apply Rankine cycle to steam power plant and compare few cycle improvement methods

CO4 Derive simple thermodynamic relations of ideal and real gases

CO5 Calculate the properties of gas mixtures and moist air and its use in psychometric processes

TEXT BOOKS :

R.K.Rajput, “A Text Book Of Engineering Thermodynamics “,Fifth Edition,2017.

Yunus a. Cengel & michael a. Boles, “Thermodynamics”, 8th edition 2015.

REFERENCES:

Arora C.P, “Thermodynamics”, Tata McGraw-Hill, New Delhi, 2003.

Borgnakke & Sonnatag, “Fundamental of Thermodynamics”, 8th Edition , 2016.

Chattopadhyay, P, "Engineering Thermodynamics", Oxford University Press, 2016.

Michael J. Moran, Howard N. Shapiro, “Fundamentals of Engineering Thermodynamics”, 8th Edition.

Nag.P.K., “Engineering Thermodynamics”, 5thEdition, Tata McGraw-Hill, New Delhi, 2013.

CE8395	STRENGTH OF MATERIALS FOR MECHANICAL ENGINEERS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the concepts of stress, strain, principal stresses and principal planes.

To study the concept of shearing force and bending moment due to external loads in determinate beams and their effect on stresses.

To determine stresses and deformation in circular shafts and helical spring due to torsion.

To compute slopes and deflections in determinate beams by various methods.

To study the stresses and deformations induced in thin and thick shells.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 9

Rigid bodies and deformable solids – Tension, Compression and Shear Stresses – Deformation of simple and compound bars – Thermal stresses – Elastic constants – Volumetric strains –Stresses on inclined planes – principal stresses and principal planes – Mohr,s circle of stress.

UNIT II TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAM 9

Beams – types transverse loading on beams – Shear force and bending moment in beams – Cantilevers – Simply supported beams and over – hanging beams. Theory of simple bending– bending stress distribution – Load carrying capacity – Proportioning of sections – Flitched beams – Shear stress distribution.

UNIT III TORSION 9

Torsion formulation stresses and deformation in circular and hollows shafts – Stepped shafts– Deflection in shafts fixed at the both ends – Stresses in helical springs – Deflection of helical springs, carriage springs.

UNIT IV DEFLECTION OF BEAMS 9

Double Integration method – Macaulay,s method – Area moment method for computation of slopes and deflections in beams - Conjugate beam and strain energy – Maxwell,s reciprocal theorems.

UNIT V THIN CYLINDERS, SPHERES AND THICK CYLINDERS 9

Stresses in thin cylindrical shell due to internal pressure circumferential and longitudinal stresses and deformation in thin and thick cylinders – spherical shells subjected to internal pressure – Deformation in spherical shells – Lame,s theorem.

TOTAL: 45 PERIODS

OUTCOMES

Students will be able to

- Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.
- Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
- Apply basic equation of simple torsion in designing of shafts and helical spring
- Calculate the slope and deflection in beams using different methods.
- Analyze and design thin and thick shells for the applied internal and external pressures

TEXT BOOKS:

Bansal, R.K., "Strength of Materials", Laxmi Publications (P) Ltd., 2016

Jindal U.C., "Strength of Materials", Asian Books Pvt. Ltd., New Delhi, 2009

REFERENCES:

Egor. P.Popov “Engineering Mechanics of Solids” Prentice Hall of India, New Delhi, 2002

Ferdinand P. Been, Russell Johnson, J.r. and John J. Dewole "Mechanics of Materials", Tata McGraw Hill Publishing ˆco. Ltd., New Delhi, 2005.

Hibbeler, R.C., "Mechanics of Materials", Pearson Education, Low Price Edition, 2013

Subramanian R., "Strength of Materials", Oxford University Press, Oxford Higher Education Series, 2010.

AT8301 SPARK IGNITION ENGINES LTPC
3 0 0 3

AIM

This course aims to impart the knowledge about spark ignition engine like fuel supply and distribution, ignition, combustion and emission.

OBJECTIVES

To impart knowledge on Gasoline fuel injection system, requirement, Components and types of ignition and combustion system.

To impart knowledge on various Emissions and alternative fuels for S.I. Engines

UNIT I GASOLINE- AIR MIXTURE REQUIREMENT AND SUPPLY SYSTEM 9

Gasoline - air mixtures. Mixture requirements - Mixture formation - Carburettor, Choke, Carburettor systems for emission control- Secondary Air Injection.

UNIT II GASOLINE INJECTION AND IGNITION SYSTEMS 9

Petrol Injection - Pneumatic and Electronic Fuel Injection Systems, Ignition systems - equirements, Timing Systems, Energy requirement, Spark plug operation, Electronic & Distributor less Ignition Systems.

UNIT III COMBUSTION IN S.I. ENGINES 9

Stages of combustion, normal and abnormal combustion, knocking, Variables affecting Knock,Features and design consideration of combustion chambers. Flame structure and speed, Cyclic variations, Lean burn combustion, Stratified charge combustion systems. Heat release correlations.

UNIT IV LIQUID AND GASEOUS FUELS FOR S.I. ENGINES 9

Liquid fuel Requirements, Utilisation techniques – Blends, Neat form, Reformed Fuels, Storage and Safety, Performance and Emission Characteristics.

Gaseous Fuel Utilisation of Hydrogen, Compressed Natural gas, Liquefied Petroleum gas, and Bio gas in SI engines.

UNIT V EMISSIONS FROM S.I ENGINES 9

Emission standards**-** Carbon Monoxide, Unburnt Hydrocarbons, Oxides of Nitrogen –sources, Emission control measures and measuring techniues for SI Engines.

TOTAL: 45 PERIODS

OUTCOME

On successful completion of this course the student will be able to understand the overall concepts of S.I engines.

TEXT BOOKS:

1. Ramalingam, K.K., Internal Combustion Engines, SciTech Publications (India) Pvt. Ltd., 2004.
2. Ganesan, V, Internal Combustion Engines, Tata McGraw Hill Book Co., 2003.

REFERENCES

B.P. Pundir Engine Combustion and Emission, 2011, Narosa Publishing House.
John B. Heywood, Internal Combustion Engine Fundamentals, McGraw Hill Book, 1998.
Mathur, M.L., and Sharma, R.P., A Course in Internal Combustion Engines, Dhanpat Rai Publications Pvt. New Delhi-2, 1993.
Obert, E.F., Internal Combustion Engine and Air Pollution, International Text Book Publishers,1983.

ME8392 MANUFACTURING TECHNOLOGY L T P C
3 0 0 3

OBJECTIVE:

The automobile components such as piston, connecting rod, crankshaft, engine block, front axle, frame, body etc., are manufactured by various types of production processes involving casting, welding, machining, metal forming, power metallurgy etc.

UNIT I CASTING 8

Casting types, procedure to make sand mould, types of core making, moulding tools, machine moulding, special moulding processes – CO2 moulding; shell moulding, investment moulding, permanent mould casting, pressure die casting, centrifugal casting, continuous casting, casting defects.

UNIT II WELDING 8

Classification of welding processes. Principles of Oxy-acetylene gas welding. A.C metal arc welding, resistance welding, submerged arc welding, tungsten inert gas welding, metal inert gas welding, plasma arc welding, thermit welding, electron beam welding, laser beam welding, defects in welding, soldering and brazing.

UNIT III MACHINING 13

General principles (with schematic diagrams only) of working and commonly performed operations in the following machines: Lathe, Shaper, Planer, Horizontal milling machine, Universal drilling machine, Cylindrical grinding machine, Capstan and Turret lathe. Basics of CNC machines. General principles and applications of the following processes: Abrasive jet machining, Ultrasonic machining, Electric discharge machining, Electro chemical machining, Plasma arc machining, Electron beam machining and Laser beam machining.

UNIT IV FORMING AND SHAPING OF PLASTICS 7

Types of plastics - Characteristics of the forming and shaping processes – Moulding of Thermoplastics – Working principles and typical applications of - Injection moulding – Plunger and screw machines – Blow moulding – Rotational moulding – Film blowing – Extrusion - Typical industrial applications – Thermoforming – Processing of Thermosets – Working principles and typical applications - Compression moulding – Transfer moulding – Bonding of Thermoplastics – Fusion and solvent methods – Induction and Ultrasonic methods

UNIT V METAL FORMING AND POWDER METALLURGY 9

Principles and applications of the following processes: Forging, Rolling, Extrusion, Wire drawing and Spinning, Powder metallurgy – Principal steps involved advantages, disadvantages and limitations of powder metallurgy.

TOTAL: 45 PERIODS

OUTCOME:

The Students can able to use different manufacturing process and use this in industry for component production

TEXT BOOKS

Hajra Choudhury, “Elements of Workshop Technology”, Vol. I and II, Media Promoters and Publishers Pvt., Ltd., Mumbai, 2005.

Nagendra Parashar B.S. and Mittal R.K., “Elements of Manufacturing Processes”, Prentice-Hall of India Private Limited, 2007.

REFERENCES

Adithan. M and Gupta. A.B., "Manufacturing Technology", New Age, 2006.

"H.M.T. Production Technology – Handbook", Tata McGraw-Hill, 2000.

Jain. R.K. and S.C. Gupta, "Production Technology", Khanna Publishers. 16th Edition,2001.

Roy. A. Linberg, "Process and Materials of Manufacture", PHI, 2000.

Serope Kalpajian, Steven R.Schmid, "Manufacturing Processes for Engineering Materials", Fourth Edition, Pearson Education, Inc. 2007.

CE8394	FLUID MECHANICS AND MACHINERY	L	T	P	C
		4	0	0	4

OBJECTIVES:

The properties of fluids and concept of control volume are studied

The applications of the conservation laws to flow through pipes are studied.

To understand the importance of dimensional analysis

To understand the importance of various types of flow in pumps.

To understand the importance of various types of flow in turbines.

UNIT I FLUID PROPERTIES AND FLOW CHARACTERISTICS 12

Units and dimensions- Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapor pressure, surface tension and capillarity. Flow characteristics – concept of control volume - application of continuity equation, energy equation and momentum equation.

UNIT II FLOW THROUGH CIRCULAR CONDUITS 12

Hydraulic and energy gradient - Laminar flow through circular conduits and circular annuli-Boundary layer concepts – types of boundary layer thickness – Darcy Weisbach equation –friction factor-Moody diagram- commercial pipes- minor losses – Flow through pipes in series and parallel.

UNIT III DIMENSIONAL ANALYSIS 12

Need for dimensional analysis – methods of dimensional analysis – Similitude –types of similitude - Dimensionless parameters- application of dimensionless parameters – Model analysis.

UNIT IV PUMPS 12

Impact of jets - Euler,s equation - Theory of roto-dynamic machines – various efficiencies– velocity components at entry and exit of the rotor- velocity triangles - Centrifugal pumps– working principle - work done by the impeller - performance curves - Reciprocating pump- working principle – Rotary pumps –classification.

UNIT V TURBINES 12

Classification of turbines – heads and efficiencies – velocity triangles. Axial, radial and mixed flow turbines. Pelton wheel, Francis turbine and Kaplan turbines- working principles - work done by water on the runner – draft tube. Specific speed - unit quantities – performance curves for turbines – governing of turbines.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to

Apply mathematical knowledge to predict the properties and characteristics of a fluid.
Can analyse and calculate major and minor losses associated with pipe flow in piping networks.
Can mathematically predict the nature of physical quantities
Can critically analyse the performance of pumps
Can critically analyse the performance of turbines.

TEXT BOOK:

Modi P.N. and Seth, S.M. "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi 2013.

REFERENCES:

Graebel. W.P, "Engineering Fluid Mechanics", Taylor & Francis, Indian Reprint, 2011
Kumar K. L., "Engineering Fluid Mechanics", Eurasia Publishing House(p) Ltd., New Delhi 2016

Robert W.Fox, Alan T. McDonald, Philip J.Pritchard, “Fluid Mechanics and Machinery”, 2011.
Streeter, V. L. and Wylie E. B., "Fluid Mechanics", McGraw Hill Publishing Co. 2010

CE8381	STRENGTH OF MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

To study the mechanical properties of materials when subjected to different types of loading.

To verify the principles studied in Fluid Mechanics theory by performing experiments in lab.

STRENGTH OF MATERIALS **30**

LIST OF EXPERIMENTS

Tension test on a mild steel rod
Double shear test on Mild steel and Aluminium rods
Torsion test on mild steel rod
Impact test on metal specimen
Hardness test on metals - Brinnell and Rockwell Hardness Number
Deflection test on beams
Compression test on helical springs
Strain Measurement using Rosette strain gauge
Effect of hardening- Improvement in hardness and impact resistance of steels.
Tempering- Improvement Mechanical properties Comparison
Unhardened specimen
Quenched Specimen and
Quenched and tempered specimen.
Microscopic Examination of
Hardened samples and
Hardened and tempered samples.

OUTCOME:

Ability to perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Universal Tensile Testing machine with double 1 shear attachment – 40 Ton Capacity	1
2	Torsion Testing Machine (60 NM Capacity)	1
3	Impact Testing Machine (300 J Capacity)	1
4	Brinell Hardness Testing Machine	1
5	Rockwell Hardness Testing Machine	1
6	Spring Testing Machine for tensile and compressive loads (2500 N)	1
7	Metallurgical Microscopes	3
8	Muffle Furnace (800 C)	1

FLUID MECHANICS AND MACHINES LABORATORY **30**

LIST OF EXPERIMENTS

Determination of the Coefficient of discharge of given Orifice meter.
Determination of the Coefficient of discharge of given Venturi meter.
Calculation of the rate of flow using Rota meter.
Determination of friction factor for a given set of pipes.
Conducting experiments and drawing the characteristic curves of centrifugal pump/ submergible pump
Conducting experiments and drawing the characteristic curves of reciprocating pump.
Conducting experiments and drawing the characteristic curves of Gear pump.
Conducting experiments and drawing the characteristic curves of Pelton wheel.
Conducting experiments and drawing the characteristics curves of Francis turbine.
Conducting experiments and drawing the characteristic curves of Kaplan turbine.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to:
Perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.
Use the measurement equipments for flow measurement.
Perform test on different fluid machinery.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. NO.	NAME OF THE EQUIPMENT	Qty.
1	Orifice meter setup	1
2	Venturi meter setup	1
3	Rotameter setup	1
4	Pipe Flow analysis setup	1
5	Centrifugal pump/submergible pump setup	1
6	Reciprocating pump setup	1
7	Gear pump setup	1
8	Pelton wheel setup	1
9	Francis turbine setup	1
10	Kaplan turbine setup	1

ME8381 COMPUTER AIDED MACHINE DRAWING L T P C
0 0 4 2

OBJECTIVES:

To make the students understand and interpret drawings of machine components
To prepare assembly drawings both manually and using standard CAD packages
To familiarize the students with Indian Standards on drawing practices and standard components
To gain practical experience in handling 2D drafting and 3D modeling software systems.

UNIT I DRAWING STANDARDS & FITS AND TOLERANCES 12

Code of practice for Engineering Drawing, BIS specifications – Welding symbols, riveted joints, keys, fasteners – Reference to hand book for the selection of standard components like bolts, nuts, screws, keys etc. - Limits, Fits – Tolerancing of individual dimensions – Specification of Fits – Preparation of production drawings and reading of part and assembly drawings, basic principles of geometric dimensioning & tolerancing.

UNIT II INTRODUCTION TO 2D DRAFTING 16

Drawing, Editing, Dimensioning, Layering, Hatching, Block, Array, Detailing, Detailed drawing.
Bearings - Bush bearing, Plummer block
Valves – Safety and non-return valves.

UNIT III 3D GEOMETRIC MODELING AND ASSEMBLY 32

Sketcher - Datum planes – Protrusion – Holes - Part modeling – Extrusion – Revolve – Sweep – Loft – Blend – Fillet - Pattern – Chamfer - Round - Mirror – Section - Assembly
Couplings – Flange, Universal, Oldham,s, Muff, Gear couplings
Joints – Knuckle, Gib & cotter, strap, sleeve & cotter joints
Engine parts – Piston, connecting rod, cross-head (vertical and horizontal), stuffing box, multi-plate clutch
Miscellaneous machine components – Screw jack, machine vice, tail stock, chuck, vane and gear pump

TOTAL:60 PERIODS

Note: 25% of assembly drawings must be done manually and remaining 75% of assembly drawings must be done by using any CAD software. The above tasks can be performed manually and using standard commercial 2D / 3D CAD software

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Follow the drawing standards, Fits and Tolerances
CO2 Re-create part drawings, sectional views and assembly drawings as per standards

TEXT BOOK:

Gopalakrishna K.R., “Machine Drawing”, 22nd Edition, Subhas Stores Books Corner, Bangalore, 2013

REFERENCES:

N. D. Bhatt and V.M. Panchal, “Machine Drawing”, 48th Edition, Charotar Publishers,2013
Junnarkar, N.D., “Machine Drawing”, 1st Edition, Pearson Education, 2004
N. Siddeshwar, P. Kanniah, V.V.S. Sastri, ”Machine Drawing” , published by Tata Mc GrawHill,2006
S. Trymbaka Murthy, “A Text Book of Computer Aided Machine Drawing”, CBS Publishers, New Delhi, 2007

HS8381	INTERPERSONAL SKILLS/LISTENING & SPEAKING	L	T	P	C
		0	0	2	1

OBJECTIVES:

The Course will enable learners to:

Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.

Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.

improve general and academic listening skills

Make effective presentations.

UNIT I

Listening as a key skill- its importance- speaking - give personal information - ask for personal information - express ability - enquire about ability - ask for clarification Improving pronunciation - pronunciation basics taking lecture notes - preparing to listen to a lecture - articulate a complete idea as opposed to producing fragmented utterances.

UNIT II

Listen to a process information- give information, as part of a simple explanation - conversation starters: small talk - stressing syllables and speaking clearly - intonation patterns - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

UNIT III

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk - greet - respond to greetings - describe health and symptoms - invite and offer - accept - decline - take leave - listen for and follow the gist- listen for detail

UNIT IV

Being an active listener: giving verbal and non-verbal feedback - participating in a group discussion - summarizing academic readings and lectures conversational speech listening to and participating in conversations - persuade.

UNIT V

Formal and informal talk - listen to follow and respond to explanations, directions and instructions in academic and business contexts - strategies for presentations and interactive communication - group/pair presentations - negotiate disagreement in group work.

TOTAL : 30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:

Listen and respond appropriately.

Participate in group discussions

Make effective presentations

Participate confidently and appropriately in conversations both formal and informal

TEXT BOOKS:

Brooks,Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011.

Richards,C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010

REFERENCES

Bhatnagar, Nitin and MamtaBhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.

Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.

Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.

Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.

Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford, 2014

MA8452	STATISTICS AND NUMERICAL METHODS	L	T	P	C
		4	0	0	4

OBJECTIVES :

This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.

To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.

To introduce the basic concepts of solving algebraic and transcendental equations.

To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.

To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 12

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) - Goodness of fit.

UNIT II DESIGN OF EXPERIMENTS 12

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi,s method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 12

Lagrange,s and Newton,s divided difference interpolations – Newton,s forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson,s 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 12

Single step methods : Taylor,s series method - Euler,s method - Modified Euler,s method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods : Milne,s and Adams - Bash forth predictor corrector methods for solving first order equations.

TOTAL : 60 PERIODS

OUTCOMES :

Upon successful completion of the course, students will be able to:

Apply the concept of testing of hypothesis for small and large samples in real life problems.

Apply the basic concepts of classifications of design of experiments in the field of agriculture.

Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.

Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications

TEXT BOOKS :

Grewal. B.S. and Grewal. J.S., “Numerical Methods in Engineering and Science ", 10th Edition, Khanna Publishers, New Delhi, 2015.

Johnson, R.A., Miller, I and Freund J., “Miller and Freund,s Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES :

Burden, R.L and Faires, J.D, "Numerical Analysis”, 9th Edition, Cengage Learning, 2016.

Devore. J.L., "Probability and Statistics for Engineering and the Sciences”, Cengage Learning, New Delhi, 8th Edition, 2014.

Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis” Pearson Education, Asia, New Delhi, 2006.

Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum,s Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 2004.

Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., “Probability and Statistics for Engineers and Scientists", 8th Edition, Pearson Education, Asia, 2007.

AT8401 COMPRESSION IGNITION ENGINES L T P C
3 0 0 3

OBJECTIVES:

To Understand the intake, exhaust, fuel injection system and combustion in diesel engines

To impart knowledge on various alternative fuels for C.I Engines

To identify the nature of pollutant formation and control in C I engines.

UNIT I INTAKE AND EXHAUST MANIFOLDS 8

Intake system components, Air filter, Intake manifold, Turbochargers, Exhaust manifold and exhaust pipe, Exhaust mufflers and Resonators.

UNIT II DIESEL INJECTION SYSTEMS 9

Direct and indirect injection systems, Inline injection pump, Rotary Pump and Injector– Construction and principle of operation, Electronic control, Common rail and unit injector systems – Construction and principle of operation.

UNIT III COMBUSTION IN C.I. ENGINES 10

Stages of combustion, vapourisation of fuel droplets and spray formation, air motion, swirl measurement, knock and engine variables, Features and design considerations of combustion chambers, delay period correlations, heat release correlations, Influence of the injection system on combustion.

UNIT IV LIQUID AND GASEOUS FUELS FOR C.I. ENGINES 9

Requirements, Utilisation techniques - Blends, Neat fuels, Reformed fuels, Emulsions, Dual fuelling, Ignition accelerators and Additives, Performance and emission characteristics.Utilisation techniques of gaseous fuels-Hydrogen, Biogas, Liquefied Petroleum gas, Compressed Natural gas in CI engines. Dual fuelling.

UNIT V EMISSIONS FORMATION AND CONTROL TECHNIQUES 9

Carbon Monoxide, Unburnt Hydrocarbons, Oxides of Nitrogen, Particulate matter and smoke – sources. Emission control measures for CI engines. Effect of emissions on environment and human beings.

TOTAL: 45 PERIODS

OUTCOME:

Upon completion of this course, the students can be able to understand the various systems and its operations, combustion, formation of emissions and alternative fuels used in CI engines.

TEXT BOOKS:

Ramalingam, K.K., Internal Combustion Engines, SciTech Publications (India) Pvt. Ltd., 2004.

Ganesan, V, Internal Combustion Engines, Tata McGraw Hill Book Co., 2003.

Rajput R.K. Internal Combustion Engines, Laxmi Publications (P) Ltd, 2006.

REFERENCES:

John B. Heywood, Internal Combustion Engine Fundamentals, McGraw Hill Book, 1998.

B.P. Pundir Engine Combustion and Emission, 2011, Narosa Publishing House.

Mathur, M.L., and Sharma, R.P., A Course in Internal Combustion Engines, Dhanpat Rai Publications Pvt. New Delhi-2, 1993.

Willard W. Pulkrabek, Engineering Fundamentals of the Internal Combustion Engines, 2007, Second Edition, Pearson Prentice Hall.

ME8491	ENGINEERING METALLURGY	L	T P	C
		3	00	3

OBJECTIVE:

To impart knowledge on the structure, properties, treatment, testing and applications of metals and non-metallic materials so as to identify and select suitable materials for various engineering applications.

UNIT I ALLOYS AND PHASE DIAGRAMS 9

Constitution of alloys – Solid solutions, substitutional and interstitial – phase diagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron – carbon equilibrium diagram. Classification of steel and cast Iron microstructure, properties and application.

UNIT II HEAT TREATMENT 9

Definition – Full annealing, stress relief, recrystallisation and spheroidising – normalising, hardening and Tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram CCR – Hardenability, Jominy end quench test - Austempering, martempering – case hardening, carburizing, Nitriding, cyaniding, carbonitriding – Flame and Induction hardening – Vacuum and Plasma hardening. .

UNIT III FERROUS AND NON-FERROUS METALS 9

Effect of alloying additions on steel- α and β stabilisers– stainless and tool steels – HSLA, Maraging steels – Cast Iron - Grey, white, malleable, spheroidal – alloy cast irons, Copper and copper alloys – Brass, Bronze and Cupronickel – Aluminium and Al-Cu – precipitation strengthening treatment – Bearing alloys, Mg-alloys, Ni-based super alloys and Titanium alloys.

UNIT IV NON-METALLIC MATERIALS 9

Polymers – types of polymer, commodity and engineering polymers – Properties and applications of various thermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET,PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, Polymers – Urea and Phenol formaldehydes)- Engineering Ceramics – Properties and applications of Al2O3, SiC, Si3N4, PSZ and SIALON –Composites-Classifications-Metal Matrix and FRP - Applications of Composites.

UNIT V MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS 9

Mechanisms of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test Izod and charpy, fatigue and creep failure mechanisms.

TOTAL: 45 PERIODS

OUTCOMES

Upon the completion of this course the students will be able to

CO1 Explain alloys and phase diagram, Iron-Iron carbide diagram and steel classification.

CO2 Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.

CO3 Summarize the mechanism of plastic deformation and testing mechanical properties.

CO4 Clarify the effect of alloying elements on ferrous and non-ferrous metals.

CO5 Differentiate different non-mettalic materials.

TEXT BOOKS:

Avner,, S.H., “Introduction to Physical Metallurgy”, McGraw Hill Book Company,1997.

Williams D Callister, “Material Science and Engineering” Wiley India Pvt Ltd, Revised Indian Edition 2014

REFERENCES:

Kenneth G.Budinski and Michael K. Budinski, “Engineering Materials”, Prentice Hall of India Private Limited, 2010.

Raghavan.V, “Materials Science and Engineering”, Prentice Hall of India Pvt. Ltd., 2015.

U.C.Jindal : Material Science and Metallurgy, "Engineering Materials and Metallurgy", First Edition, Dorling Kindersley, 2012

Upadhyay. G.S. and Anish Upadhyay, “Materials Science and Engineering”, Viva Books Pvt. Ltd., New Delhi, 2006.

EC8396 ELECTRONICS AND MICROPROCESSORS L T P C
3 0 0 3

OBJECTIVE:

To enable the students to understand the fundamental concepts of Semi Conductors, Transistors, Rectifiers, Digital Electronics and 8085 Microprocessors

UNIT I SEMICONDUCTORS AND RECTIFIERS 9

Classification of solids based on energy band theory-Intrinsic semiconductors-Extrinsic semiconductors-P type and N type-PN junction-Zenor effect-Zenor diode characteristics- Half wave and full wave rectifiers -Voltage regulation

UNIT II TRANSISTORS AND AMPLIFIERS 12

Bipolar junction transistor- CB, CE, CC configuration and characteristics-Biasing circuits- Class A, B and C amplifiers- Field effect transistor-Configuration and characteristic of FET amplifier-SCR, Diac, Triac, UJT-Characteristics and simple applications-Switching transistors-Concept of feedback-Negative feedback-Application in temperature and motor speed control.

UNIT III DIGITAL ELECTRONICS 9

Binary number system - AND, OR, NOT, NAND, NOR circuits-Boolean algebra- Exclusive OR gate - Flip flops-Half and full adders-Registers-Counters-A/D and D/A conversion.

UNIT IV 8085 MICROPROCESSOR 9

Block diagram of microcomputer-Architecture of 8085-Pin configuration-Instruction set- Addressing modes-Simple programs using arithmetic and logical operations.

UNIT V INTERFACING AND APPLICATIONS OF MICROPROCESSOR 6

Basic interfacing concepts - Interfacing of Input and Output devices-Applications of microprocessor Temperature control, Stepper motor control, traffic light control.

TOTAL: 45 PERIODS

OUTCOMES:

Ability to perform performing on 8085 Microprocessor to control devices
Ability to use microcontroller and programming

TEXT BOOKS

Milman and Halkias, “Integrated Electronics”, Tata McGraw-Hill publishers, 1995.

Ramesh Goankar, “Microprocessor Architecture”, Programming and Applications with 8085, Wiley Eastern, 1998.

REFERENCES

Malvino and Leach, “Digital Principles and Applications”, Tata McGraw-Hill, 1996

Mehta V.K, “Principles of Electronics”, S. Chand and Company Ltd., 1994

Dougles V.Hall, “Microprocessor and Interfacing”, Programming and Hardware, Tata McGraw-Hill, 1999.

Salivahanan S, Suresh Kumar N, Vallavaraj A, “Electronic Devices and Circuits” First Edition, Tata McGraw-Hill, 1999.

AT8402 AUTOMOTIVE CHASSIS LTPC
3 0 0 3

OBJECTIVE:

Study of the Constructional details and Theory of important drive line, Structural, Steering, Braking and Suspension Systems of Automobiles. Problem–Solving in Steering Mechanism, Propeller Shaft, Braking and Suspension Systems are to be done.

UNIT I LAYOUT, FRAME, FRONT AXLE AND STEERING SYSTEM 9

Basic construction of chassis, Types of Chassis layout, with reference to Power Plant location and drive, various, types of frames, Loads acting on vehicle frame, Types of Front Axles and Stub Axles, Front Wheel Geometry. Condition for True Rolling Motion. Ackerman,s and Davi,s Steering Mechanisms, Steering Linkages, Different Types of Steering Gear boxes, Slip Angle, Over–Steer and Under–Steer, Reversible and Irreversible Steering, Power Steering.

UNIT II DRIVE LINE, FINAL DRIVE AND DIFFERENTIAL 9

Driving Thrust and its effects, torque reactions and side thrust, Hotchkiss drive, torque tube drive, radius rods and stabilizers, Propeller Shaft, Universal Joints, Constant Velocity Universal Joints, Final drive, different types of final drive, Worm and Worm wheel, straight bevel gear, spiral bevel gear and hypoid gear final drive. Differential principle. Constructional details of differential unit, Differential housings, Non–Slip differential, Differential locks.

UNIT III REAR AXLES, WHEELS, RIMS AND TYRES 9

Construction of rear axles, Types of Loads acting on rear axles, Full –Floating, Three–Quarter Floating and Semi–Floating Axles, Twist beam rear axle, Types, Multi axles vehicles. Wheels and Rims, Types of Tyres and their constructional details.

UNIT IV SUSPENSION SYSTEM 9

Requirement of Suspension System, Types of Suspension Springs, Constructional details and characteristics of Single Leaf, Multi–Leaf spring, Coil and Torsion bar Springs, Rubber, Pneumatic and Hydro – elastic Suspension Spring Systems, Independent Suspension System, Shock Absorbers, Types and Constructional details of Leaf and Coil Springs.

UNIT V BRAKE SYSTEMS 9

Need for Brake systems, Stopping Distance, Time and Braking Efficiency, Effect of Weight Transfer during Braking, Classification of brakes , Braking Torque, drum brake and disc Brake Theory, Types and Construction of Hydraulic Braking System, Mechanical Braking System, Pneumatic Braking System, Power–Assisted Braking System, Servo Brakes, Retarders – antilock braking systems(ABS).

TOTAL : 45 PERIODS

OUTCOME:

The students will understand the constructional, working principle of various sub system of an automobile.

TEXT BOOKS

Newton Steeds and Garret, “Motor Vehicles” 13th Edition, Butterworth, London, 2005.
Heinz Hazler, “Modern Vehicle Technology”, Butterworth, London, 2005.
Devaradjane. Dr. G., Dr. M. Kumaresan, "Automobile Engineering", AMK Publishers, 2013.

REFERENCES

Heldt P.M., “Automotive Chassis” Chilton Co., New York, 1990
Giri. N.K., “Automotive Mechanics” Khanna Publishers, New Delhi, 2005.
Milliken & Milliken, “Race Car Vehicle Dynamics”, SAE, 1995

PR8451 MECHANICS OF MACHINES LTPC
3 0 0 3

OBJECTIVES:

To understand the principles in the formation of mechanisms and their kinematics.
To understand the effect of friction in different machine elements.
To understand the importance of balancing and vibration.

UNIT I KINEMATICS OF MACHINES 9

Mechanisms – Terminology and definitions – kinematics inversions of 4 bar and slide crank chain – kinematics analysis in simple mechanisms – velocity and acceleration polygons – Cam and followers – classifications – displacement diagrams - layout of plate cam profiles – derivatives of followers motion

UNIT II GEARS and GEAR TRAINS 9

Spur gear – law of toothed gearing – involute gearing – Interchangeable gears – Gear tooth action interference and undercutting – nonstandard teeth – gear trains – parallel axis gears trains – epicyclic gear trains.

UNIT III FRICTION 9

Types of friction – Friction Drives -friction in screw threads – bearings – Friction clutches – Belt drives

UNIT IV BALANCING AND MECHANISM FOR CONTROL 9

Static and Dynamic balancing – Balancing of revolving and reciprocating masses – Balancing machines -Balancing a single cylinder engine – Balancing of Multi-cylinder inline, V-engines – Partial balancing in engines- Governors and Gyroscopic effects..

UNIT V VIBRATION 9

Free, forced and damped vibrations of single degree of freedom systems – force transmitted to supports – vibration Isolation – vibration absorption – torsional vibration of shafts – single and multirotor systems – geared shafts – critical speed of shafts.

TOTAL: 45 PERIODS

OUTCOMES:

Student will be able to

Understand the principles in the formation of mechanisms and their kinematics.
Understand the construction features of Gears and Gear Trains.
Understand the effect of friction in different machine elements.
Understand the importance of balancing.
Understand the importance of Governors and Gyroscopic effects.
Understand the importance of vibration.

TEXT BOOKS:

Ambekar A.G.,Mechanism and Machine Theory‖ Prentice Hall of India, New Delhi, 2007

Shigley J.E., Pennock G.R and Uicker J.J., —Theory of Machines and Mechanisms‖, Oxford University Press, 2003

REFERENCES:

Ghosh.A, and A.K.Mallick, —Theory and Machine ‖, Affiliated East-West Pvt. Ltd., New Delhi, 1988.

Ramamurthi. V., "Mechanisms of Machine", Narosa Publishing House, 2005.

Rao.J.S. and Dukkipatti R.V. —Mechanisms and Machines ‖, Wiley-Eastern Ltd., New Delhi, 1998.

Robert L.Norton, "Design of Machinery", McGraw-Hill, 2012.

Thomas Bevan, —Theory of Machines‖, CBS Publishers and Distributors, 2010.

AT8411 AUTOMOTIVE COMPONENTS LABORATORY LTPC
0 0 4 2

OBJECTIVE:

To train the Students to know the details of different components, dismantling and assembling them.

LIST OF EXPERIMENTS

Dismantling and study of Multi-cylinder Petrol Engine
Assembling of Multi-cylinder Petrol Engine
Dismantling and study of Multi-cylinder Diesel Engine
Assembling of Multi-cylinder Diesel Engine
Study of petrol engine fuel system
Study of diesel engine fuel system
Study and measurement of light and heavy commercial Vehicle Frame
Study, dismantling and assembling of front and rear Axles
Study, dismantling and assembling of differential
Study, dismantling and assembling of Clutch
Study, dismantling and assembling of Gear Box
Study of steering system

TOTAL: 60 PERIODS

OUTCOME:

Ability to dismantle and assemble the automobile components

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. No.	NAME OF THE EQUIPMENT	Qty.
1	Multi Cylinder Petrol Engine	2 No.
2	Multi Cylinder Diesel Engine	2 No.
3	Petrol and Diesel fuel systems	2 No. Each
4	Heavy duty vehicle chassis frame	1 No.
5	Light duty vehicle chassis frame	1 No.
6	Front axle	2 No.
7	Rear axle	2 No.
8	Differential	2 No.
9	Clutch and Gear box (light duty, heavy duty)	2 No. Each
10	Steering systems with different gearboxes	4 No.

EC8382 ELECTRONICS AND MICROPROCESSORS LABORATORY LTPC
0 0 4 2

OBJECTIVE:

To supplement the theoretical knowledge with practical use of electronic components and programming and control using micro-processors

LIST OF EXPERIMENTS

ELECTRONICS **40**

VI Characteristics of PN Junction Diode
VI Characteristics of Zener Diode
Characteristics of CE Transistor
Characteristics of JFET
Characteristics of Uni Junction Transistor
RC or Wein Bridge Oscillator
Study of Logic Gates (Basic Gates)
Half Adder and Full Adder
Shift Registers and Counters
Operational Amplifier (Adder, Subtractor, Differentiator, Integrator, Inverting and Non – Inverting

MICROPROCESSORS **20**

Block Transfer
8 bit Addition, Subtraction
Multiplication and Division
Maximum and Minimum of block of data
Sorting
Stepper Motor Interfacing

TOTAL : 60 PERIODS

OUTCOME:

Ability to perform speed characteristic of different electronics and microprocessor machine

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. No.	NAME OF THE EQUIPMENT	Qty.
1	Voltmeters	5 Nos.
2	Ammeters	5 Nos.
3	PN Diode, BJT, JFET, Logic Gates, Shift Registers and Counters	1 set.
4	Digital Logic Trainer Kits	1 No
5	Breadboards	1 No
6	Microprocessor Kits – 8085	5 Nos.
7	D/A Converter Interface	1 No
8	Stepper Motor Interface	1 No.
9	CRO	1 No.
10	Wavefarm Generator	1 No.
11	Multimeter	1 No.

ME8593	DESIGN OF MACHINE ELEMENTS	L	T	P	C
		3	0	0	3

OBJECTIVES

To familiarize the various steps involved in the Design Process

To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.

To learn to use standard practices and standard data

To learn to use catalogues and standard machine components
(Use of P S G Design Data Book is permitted)

UNIT I STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS 9

Introduction to the design process - factors influencing machine design, selection of materials based on mechanical properties - Preferred numbers, fits and tolerances – Direct, Bending and torsional stress equations – Impact and shock loading – calculation of principle stresses for various load combinations, eccentric loading – curved beams – crane hook and ˆC, frame- Factor of safety - theories of failure – Design based on strength and stiffness – stress concentration – Design for variable loading.

UNIT II SHAFTS AND COUPLINGS 9

Design of solid and hollow shafts based on strength, rigidity and critical speed – Keys, keyways and splines - Rigid and flexible couplings.

UNIT III TEMPORARY AND PERMANENT JOINTS 9

Threaded fastners - Bolted joints including eccentric loading, Knuckle joints, Cotter joints – Welded joints, riveted joints for structures - theory of bonded joints.

UNIT IV ENERGY STORING ELEMENTS AND ENGINE COMPONENTS 9

Various types of springs, optimization of helical springs - rubber springs - Flywheels considering stresses in rims and arms for engines and punching machines- Connecting Rods and crank shafts.

UNIT V BEARINGS 9

Sliding contact and rolling contact bearings - Hydrodynamic journal bearings, Sommerfeld Number, Raimondi and Boyd graphs, -- Selection of Rolling Contact bearings.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the influence of steady and variable stresses in machine component design.
CO2 Apply the concepts of design to shafts, keys and couplings.
CO3 Apply the concepts of design to temporary and permanent joints.
CO4 Apply the concepts of design to energy absorbing members, bearings and connecting rod.
CO5 Apply the concepts of design to bearings.

TEXT BOOKS:

Bhandari V, “Design of Machine Elements”, 4th Edition, Tata McGraw-Hill Book Co, 2016.
Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett “Mechanical Engineering Design”, 9th Edition, Tata McGraw-Hill, 2011.

REFERENCES:

Alfred Hall, Halowenko, A and Laughlin, H., “Machine Design”, Tata McGraw-Hill BookCo.(Schaum,s Outline), 2010

Ansel Ugural, “Mechanical Design – An Integral Approach", 1st Edition, Tata McGraw-Hill Book Co, 2003.

P.C. Gope, “Machine Design – Fundamental and Application”, PHI learning private ltd, New Delhi, 2012.

R.B. Patel, “Design of Machine Elements”, MacMillan Publishers India P Ltd., Tech-Max Educational resources, 2011.

Robert C. Juvinall and Kurt M. Marshek, “Fundamentals of Machine Design”, 4th Edition, Wiley, 2005

Sundararajamoorthy T. V. Shanmugam .N, “Machine Design”, Anuradha Publications, Chennai, 2015.

AT8501 AUTOMOTIVE TRANSMISSION LTPC

3 0 0 3

OBJECTIVE:

To know about the various transmission and drine line units of automobiles.

UNIT I CLUTCH AND GEAR BOX 9

Requirement of transmission system, Different types of clutches, principle & Construction of Single plate coil spring and Diaphragm spring clutches., Need and Objectives of Gear box. Construction and operation of Sliding mesh, Constant mesh and Synchromesh gearboxes. – Determination of gear ratios for vehicles. Performance characteristics in different speeds. Problems on performance of automobile such as Resistance to motion, Tractive effort, Engine speed & Power and acceleration.

UNIT II HYDRODYNAMIC TRANSMISSION 9

Fluid coupling-Principle-Constructional details. Torque capacity. Performance characteristics. Reduction of drag torque in fluid coupling. Torque converter-Principle-constructional details, performance characteristics. Multistage torque converters and Polyphase torque converters.

UNIT III EPICYCLIC GEARBOXES USED IN AUTOMATIC TRANSMISSION 9

Principle of Planetary gear trains - Wilson Gear box, Cotal electromagnetic transmission- Hydraulic control system for Automatic Transmission.

UNIT IV AUTOMATIC TRANSMISSION APPLICATIONS 9

Need for automatic transmission, Four speed longitudinally mounted automatic transmission - Chevrolet “Turboglide” Transmission, Continuously Variable Transmission (CVT) – Types – Operations of a typical CVT.

UNIT V HYDROSTATIC AND ELECTRIC DRIVE 9

Hydrostatic drive; Various types of hydrostatic systems – Principles of Hydrostatic drive system. Advantages and limitations. Comparison of hydrostatic drive with hydrodynamic drive, construction and working of typical Janny hydrostatic drive. Electric drive-types- Principle of early and modified Ward Leonard Control system-Advantages & limitations.

TOTAL : 45 PERIODS

OUTCOME

The students will understand the constructional, working principle of various types of manual and automotive transmission of an automobile.

TEXT BOOKS:

Heldt, P.M., "Torque converters", Chilton Book Co., 1962.
Newton and Steeds, "Motor vehicles", Illiffe Publishers, 1985.
Devaradjane. G., Kumaresan. M., "Automobile Engineering", AMK Publishers, 2013.

REFERENCES:

SAE Transactions 900550 & 930910.
Hydrostatic transmissions for vehicle applications, I Mech E Conference, 1981-88.
Crouse,W.H., Anglin,D.L.," Automotive Transmission and Power Trains construction", McGraw Hill, 1976.
Heinz Heisler, "Advance vehicle Technology", Butterworth-Heinemann, 2002

AT8502 AUTOMOTIVE ELECTRICAL AND ELECTRONICS SYSTEMS L T P C
3 0 0 3

OBJECTIVES

Knowledge in vehicle electrical and electronics components for engine operation.
Enhancing the knowledge of revsor and microprocessor applications in vehicle control systems.
Gaining information's on modern safety system in vehicle braking.

UNIT I BATTERIES AND STARTING SYSTEM 10

Different types of Batteries – principle, rating, testing and charging. Starter motors characteristics, capacity requirements. Drive mechanisms. Starter switches.

UNIT II CHARGING SYSTEM LIGHTING AND ACCESSORIES 9

DC Generators and Alternators their characteristics. Control unit – cut out, electronic regulators. Vehicle interior lighting system. Vehicle exterior lighting system. Wiring requirements. Lighting design. Dashboard instruments. Horn, trafficator.

UNIT III ELECTRONIC IGNITION AND INJECTION SYSTEM 9

Spark plugs. Advance mechanisms. Different types of ignition systems. Electronic fuel injection systems, mono and multi point fuel injection system (MPFI).

UNIT IV SENSORS AND MICROPROCESSORS IN AUTOMOBILES 9

Basic sensor arrangements. Types of sensors – oxygen sensor, hot wire anaemometer sensor, vehicle speed sensor, detonation sensor, accelerometer sensor, crank position sensor. Microprocessor and microcomputer controlled devices in automobiles such voice warning system, travel information system, keyless entry system, automatic transmission system, electronic steering system.

UNIT V SAFETY SYSTEMS 8

Antilock braking system, air bag restraint system, voice warning system, seat belt system, road navigation system, anti theft system.

TOTAL : 45 PERIODS

OUTCOME:

The student will have to know about all theoretical information and about electrical components used in a vehicle.

TEXT BOOK:

1. Judge. A.W., "Modern Electrical Equipment of Automobiles", Chapman & Hall, London, 1992

REFERENCES:

Young.A.P., & Griffiths.L., "Automobile Electrical Equipment", English Language Book Society & New Press, 1990

Spreadbury. F.G., "Electrical Ignition Equipment", Constable & Co Ltd., London, 1962

Robert N Brady "Automotive computers and Digital Instrumentation". A Reston Book, Prentice Hill, Eagle Wood Cliffs, New Jersey, 1988.

AT8503 VEHICLE DESIGN AND DATA CHARACTERISTICS L T P C
3 0 0 3

OBJECTIVE:

Students have to collect important technical specifications of an automobile from Automobile Journals and keeping this, as a guide, they have to calculate and tabulate various vehicle performance parameters and design parameters and to draw curves using these data.

UNIT I INTRODUCTION 9

Assumptions to be made in designing a vehicle, Range of values for Gross Vehicle Weight, Frontal Area, maximum speed, maximum acceleration, gradability in different gears, Basics of Automobile Design.

UNIT II RESISTANCE TO VEHICLE MOTION 9

Calculation, Tabulation and Plotting of Curves for Air and Rolling Resistances at various vehicle speeds, Calculation and Plotting of Driving force, Power requirement for different loads and acceleration, Maximum Power calculation.

UNIT III PERFORMANCE CURVES – I 9

Calculation, Tabulation and Plotting of Torque and Mechanical Efficiency for different vehicle speeds, Interpolation of Pressure – Volume diagram, Calculation of frictional Mean Effective Pressure, Calculation of Engine Cubic Capacity, Bore and Stroke Length.

UNIT IV PERFORMANCE CURVES – II 9

Connecting rod length to Crank Radius Ratio, Plotting of Piston Velocity and Acceleration against Crank Angle, Plotting Gas force, inertia force and Resultant force against Crank Angle, Turning Moment and Side Thrust against Crank Angle.

UNIT V GEAR RATIOS 9

Determination of Gear Ratios, Acceleration and Gradability, Typical Problems on Vehicle performance

TOTAL: 45 PERIODS

OUTCOME

The students can able to understand the basic design principle of vehicle, able to draw the performance curves pertain to engine and chassis.

TEXT BOOKS

Giri. N. K., "Automotive Mechanics", Khanna Publishers, New Delhi, 2005.

Heldt, P.M., "High Speed Combustion Engines", Oxford and I.B.H. Publishing Co., Kolkata, 2002.

REFERENCE:

1. Gupta. R.B., "Automobile Engineering", Sathya Prakashan, 8 edu., 2013.

AT8504 AUTOMOTIVE FUELS AND LUBRICANTS L T P C
3 0 0 3

OBJECTIVE:

To understand the properties of fuels and lubricants for the design and operation of the I.C engines.

UNIT I MANUFACTURE OF FUELS AND LUBRICANTS 9

Structure of petroleum, refining process, fuels, thermal cracking, catalytic cracking, polymerization, alkylation, isomerisation, blending, products of refining process. Manufacture of lubricating oil base stocks, manufacture of finished automotive lubricants.

UNIT II THEORY OF LUBRICATION 9

Engine friction: introduction, total engine friction, effect of engine variables on friction, hydrodynamic lubrication, elasto hydrodynamic lubrication, boundary lubrication, bearing lubrication, functions of the lubrication system, introduction to design of a lubricating system.

UNIT III LUBRICANTS 9

Specific requirements for automotive lubricants, oxidation deterioration and degradation of lubricants, additives and additive mechanism, synthetic lubricants, classification of lubricating oils, properties of lubricating oils, tests on lubricants. Grease, classification, properties, test used in grease.

UNIT IV PROPERTIES AND TESTING OF FUELS 9

Thermo-chemistry of fuels, properties and testing of fuels, relative density, calorific value, flash point, fire point, distillation, vapour pressure, spontaneous ignition temperature, viscosity, pour point, flammability, ignitability, diesel index, API gravity, aniline point, carbon residue, copper strip corrosion etc.

UNIT V COMBUSTION & FUEL RATING 9

SI Engines – flame propagation and mechanism of combustion, normal combustion, knocking, octane rating, fuel requirements. CI Engine, mechanism of combustion, diesel knock, cetane rating, fuel requirements. Additive - mechanism, requirements of an additive, petrol fuel additives and diesel fuel additives – specifications of fuels.

TOTAL : 45 PERIODS

OUTCOME:

At the end of the course, the student can understand the importance, manufacturing methods, testing methods, combustion methodology of automotive fuels and lubricants.

TEXT BOOKS:

Ganesan.V., “Internal Combustion Engineering”, Tata McGraw-Hill Publishing Co., New Delhi, 2003.

Mathur. M.L., Sharma. R.P. “A course in internal combustion engines”, Dhanpatrai publication, 2003.

Obert. E.F “Internal Combustion Engineering and Air Pollution”, International book Co., 1988.

REFERENCES:

Brame, J.S.S. and King, J.G. – "Fuels Solids, Liquids, Gaseous". Edward Arnold, 1961

Francis, W, "Fuels and Fuel Technology", Vol. I & II, Pergamon, 1965

Hobson, G.D. & Pohl.W "Modern Petroleum Technology", 1974

Lansdown. A.R., Lubrication, "A practical guide to lubricant selection", Pergamon press, 1982.

Raymond. C. Gunther, "Lubrication", Chilton Book Co., 1971.

AT8511 AUTOMOTIVE ELECTRICAL AND ELECTRONICS LABORATORY LTPC
0 0 4 2

OBJECTIVE:

To introduce the testing procedure for electrical and electronics system in automobile.

LIST OF EXPERIMENTS

a. Electrical Laboratory

Testing of batteries and battery maintenance
Testing of starting motors and generators
Testing of regulators and cut – outs
Diagnosis of ignition system faults
Study of Automobile electrical

wiring **b. Electronics Laboratory**

Study of rectifiers and filters
Study of logic gates, adder and flip-flops
Study of SCR and IC timer
Interfacing Sensors like RTD, LVDT, Load Cell etc.
Interfacing ADC for Data Acquisition
Interfacing DAC for Control Application
Interfacing A/D converter and simple data acquisition
Micro controller programming and interfacing
Interfacing Actuators
EPROM Programming
Fault Diagnosis of various sensors

TOTAL: 60 PERIODS

OUTCOME:

Ability to rectify and faults in electrical and electronics systems and maintain the same.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Battery, hydrometer, voltage tester	1 No. each
2	Starter motor, regulator, cut-out	1 No. each
3	Distributor, ignition coil, spark plug	1 No. each
4	Auto electrical wiring system	1 No.
5	Rectifiers, filters	15 Nos. each
6	Bread board, Logic gates ICs,	15 Nos. each
7	Amplifier	15 Nos
8	IC timer	15 Nos
9	Data logger	1 No.
10	8085 trainer kit	10 Nos
11	ADC interface board	2 Nos
12	DAC interface board	2 Nos
13	Sensors like RTD, Load cell, LVDT	2 Nos
14	Actuators like stepper motor	2 Nos

AT8512 AUTOMOTIVE FUELS AND LUBRICANTS LABORATORY LTPC
0 0 4 2

OBJECTIVE:

To study the characteristics of the fuels and Lubricants used in automobile

LIST OF EXPERIMENTS

Study of International and National standards for fuels and lubricants.
Study of Octane and Cetane Number of fuels.
ASTM distillation test of liquid fuels
Aniline Point test of diesel
Calorific value of liquid fuel.
Calorific value of gaseous fuel.
Reid vapour pressure test.
Flash and Fire points of petrol and diesel.
Copper strip Corrosion Test
Cloud & Pour point Test.
Temperature dependence of viscosity of lubricants & Fuels by Redwood Viscometer.
Viscosity Index of lubricants & Fuels by Saybolt Viscometer
Ash content and Carbon Residue Test
Drop point of grease and mechanical penetration in grease.

TOTAL: 60 PERIODS

OUTCOME:

Ability to characteristic and chase the fuels and Lubricantes for the automobiles.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Flash and fire point apparatus (for petrol)	1 No.
2	Aniline point Apparatus	1 No
3	Reid vapor pressure test Apparatus	1 No.
4	Bomb and Gas Calorimeters	1 No.each
5	Carbon Residue Test Apparatus	1 No.
6	Copper Strip Corrosion Test Apparatus	1 No.
7	Cloud and Pour point Apparatus	1 No.
8	Redwood Viscometer	1 No.
9	Saybolt Viscometer	1 No.
10	ASTM distillation test Apparatus	1 No.
11	Ash content Test Apparatus	1 No.
12	Drop point and penetration Apparatus for grease	1 No.

HS8581 PROFESSIONAL COMMUNICATION L T P C 0021

OBJECTIVES: The course aims to:

Enhance the Employability and Career Skills of students
Orient the students towards grooming as a professional
Make them Employable Graduates
Develop their confidence and help them attend interviews successfully.

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview - one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes

TOTAL : 30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:

Make effective presentations
Participate confidently in Group Discussions.
Attend job interviews and be successful in them.
Develop adequate Soft Skills required for the workplace

Recommended Software

Open Source Software
Win English

REFERENCES:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015
E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.
Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014
S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

GE8077 TOTAL QUALITY MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:

To facilitate the understanding of Quality Management principles and process.

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.

UNIT II TQM PRINCIPLES 9

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I 9

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II 9

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM 9

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation—Documentation—Internal Audits—Registration--**ENVIRONMENTAL MANAGEMENT SYSTEM:** Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001—Benefits of EMS.

TOTAL: 45 PERIODS

OUTCOME:

The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXT BOOK:

Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, “Total Quality Management”, Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
ISO 9001-2015 standards

AT8601 AUTOMOTIVE ENGINE COMPONENTS DESIGN L T P C
3 0 0 3

OBJECTIVE:

To make the students understand the design concept and principles of various engine components. These concepts and principles are familiarized for design of components.

UNIT I INTRODUCTION 9

Engineering materials - Introduction endurance limit, notch sensitivity. Tolerances, types of tolerances and fits, design considerations for interference fits, surface finish, surface roughness, Rankine,s formula - Tetmajer,s formula - Johnson formula- design of pushrods.

UNIT II DESIGN OF CYLINDER, PISTON AND CONNECTING ROD 9

Choice of material for cylinder and piston, design of cylinder, piston, piston pin, piston rings, piston failures, lubrication of piston assembly. Material for connecting rod, determining minimum length of connecting rod, small end design, shank design, design of big end cap bolts.

UNIT III DESIGN OF CRANKSHAFT 9

Balancing of I.C. engines, significance of firing order. Material for crankshaft, design of crankshaft under bending and twisting, balancing weight calculations, development of short and long crankarms. Front and rear-end details.

UNIT IV DESIGN OF FLYWHEELS 9

Determination of the mass of a flywheel for a given co- efficient of speed fluctuation. Engine flywheel - stresses on the rim of the flywheels. Design of hubs and arms of the flywheel, turning moment diagram.

UNIT V DESIGN OF VALVES AND VALVE TRAIN 9

Design aspects of intake & exhaust manifolds, inlet & exhaust valves, valve springs, tappets and valve train. Design of cam & camshaft. Design of rocker arm. Cam profile generation.

TOTAL: 45 PERIODS

Note: (Use of P S G Design Data Book is permitted in the University examination)

OUTCOME:

Upon completion of the course, students will be able to impart knowledge in automotive engine. The detailed concept, construction and principle of operation of engine and various engine components, combustion, cooling and lubrication systems will be taught to the students. At the end of the course the students will have command over automotive engines and the recent development in the area of engines.

TEXT BOOK:

Khurmi. R.S. & Gupta. J.K., "A text book of Machine Design", Eurasia Publishing House (Pvt) Ltd, 2001.

REFERENCES:

Jain.R.K, “Machine Design”, Khanna Publishers, New Delhi, 2005.
Giri.N.K, "Automobile Mechanics", Khanna Publishers, New Delhi, 2007.

AT8602 AUTOMOTIVE CHASSIS COMPONENTS DESIGN L T P C
3 0 0 3

OBJECTIVE:

The student will be able to understand the fundamental principles involved in design of components of automotive chassis, the complete design exercise and arrive at important dimensions of chassis components.

UNIT I VEHICLE FRAME AND SUSPENSION 9

Study of loads-moments and stresses on frame members. Design of frame for passenger and commercial vehicle - Design of leaf Springs-Coil springs and torsion bar springs.

UNIT II FRONT AXLE AND STEERING SYSTEMS 9

Analysis of loads-moments and stresses at different sections of front axle. Determination of bearing loads at Kingpin bearings. Wheel spindle bearings. Choice of Bearings. Determination of optimum dimensions and proportions for steering linkages, ensuring minimum error in steering. Design of front axle beam.

UNIT III CLUTCH 9

Design of single plate clutch, multiplate clutch and cone clutch. Torque capacity of clutch. Design of clutch components, Design details of roller and sprag type of clutches.

UNIT IV GEAR BOX 9

Gear train calculations, layout of gearboxes. Calculation of bearing loads and selection of bearings. Design of three speed and four speed gearboxes.

UNIT V DRIVE LINE AND REAR AXLE 9

Design of propeller shaft. Design details of final drive gearing. Design details of full floating, semi-floating and three quarter floating rear shafts and rear axle housings and design aspects of final drive.

TOTAL: 45 PERIODS

OUTCOME:

At the end of the course, the student can able to design the automotive components like frame, suspension systems, axles, clutch, gear box, drive line components etc

TEXT BOOKS:

Giri, N.K., "Automobile Mechanics", Khanna publishers, New Delhi, 2007.

Khurmi. R.S. & Gupta. J.K., "A textbook of Machine Design", Eurasia Publishing House (Pvt) Ltd, 2001.

REFERENCES:

Dean Averns, "Automobile Chassis Design", Illife Book Co., 2001.

Heldt, P.M., "Automotive Chassis", Chilton Book Co., 1992.

AT8603 **TWO AND THREE WHEELERS** **LTPC**
3 0 0 3

OBJECTIVE:

The aim of this course is to make the students to know and understand the constructional details operating characteristics and vehicle design aspects

UNIT I THE POWER UNIT 9

Two stroke and four stroke SI & CI engine Construction and Working, merits and demerits, Symmetrical and unsymmetrical valve & port timing diagrams. Scavenging process.

UNIT II FUEL AND IGNITION SYSTEMS 9

Fuel system – Different circuits in two wheeler fuel systems, fuel injection system. Lubrication system, Ignition systems - Magneto coil and battery coil spark ignition system, Electronic ignition System, Starting system - Kick starter system – Self starter system. Recent technologies.

UNIT III CHASSIS AND SUB-SYSTEMS 9

Main frame for two and three wheelers, its types, Chassis and different drive systems for two wheelers, Single, multiple plates and centrifugal clutches, Gear box and its and various gear controls in two wheelers. Front and rear suspension systems. Shock absorbers. Panel meters and controls on handle bar, Freewheeling devices

UNIT IV BRAKES AND WHEELS 8

Drum brakes & Disc brakes Construction and Working and its Types, Front and Rear brake links lay-outs. Brake actuation mechanism. Spoked wheel, cast wheel, Disc wheel & its merits and demerits. Tyres and tubes Construction & its Types. Steering geometry.

UNIT V TWO & THREE WHEELERS – CASE STUDY 10

Case study of Sports bike, Motor cycles, Scooters and Mopeds - Auto rickshaws, Pick up van, Delivery van and Trailer. Servicing and maintenance. Recent developments.

TOTAL : 45 PERIODS

OUTCOME:

The students can able to understand the various subsystem of two and three wheeler and also know how it is different from light motors and heavy motor vehicles.

TEXT BOOK:

1. Irving,P.E.," Motor cycle Engineering", Temple Press Book, London, 1992.

REFERENCES:

Bryaut, R.V., Vespa "Maintenance and Repair series".
Marshall Cavendish, Encyclopedia of Motor cycling, 20 volumes, New York and London, 1989.
Ramalingam. K. K., "Two Wheelers", Scitech publications, Chennai,2009
Raymond Broad Lambretta – "A practical guide to maintenance and repair", 1987.
The Cycle Motor Manual, Temple Press Ltd., London, 1990.

AT8604 **VEHICLE DYNAMICS** **LTPC**
3 0 0 3

OBJECTIVE:

To know about the application of basic mechanics principles for dynamic analysis of vehicles.

UNIT I CONCEPT OF VIBRATION 9

Definitions, Modeling and Simulation, Global and Vehicle Coordinate System, Free, Forced, Undamped and Damped Vibration, Response Analysis of Single DOF, Two DOF, Multi DOF, Magnification factor, Transmissibility, Vibration absorber, Vibration measuring instruments, Torsional vibration, Critical speed.

UNIT II TIRES 9

Tire forces and moments, Tire structure, Longitudinal and Lateral force at various slip angles, rolling resistance, Tractive and cornering property of tire. Performance of tire on wet surface. Ride property of tires. Magic formulae tire model, Estimation of tire road friction. Test on Various road surfaces. Tire vibration.

UNIT III VERTICAL DYNAMICS 9

Human response to vibration, Sources of Vibration. Design and analysis of Passive, Semi-active and Active suspension using Quarter car, half car and full car model. Influence of suspension stiffness, suspension damping, and tire stiffness. Control law for LQR, H-Infinite, Skyhook damping. Air suspension system and their properties.

UNIT IV LONGITUDINAL DYNAMICS AND CONTROL 9

Aerodynamic forces and moments. Equation of motion. Tire forces, rolling resistance, Load distribution for three wheeler and four wheeler. Calculation of Maximum acceleration, Reaction forces for Different drives. Braking and Driving torque. Prediction of Vehicle performance. ABS, stability control, Traction control.

UNIT V LATERAL DYNAMICS 9

Steady state handling characteristics. Steady state response to steering input. Testing of handling characteristics. Transient response characteristics, Direction control of vehicles. Roll center, Roll axis, Vehicle under side forces. Stability of vehicle on banked road, during turn. Effect of suspension on cornering.

TOTAL : 45 PERIODS

OUTCOME:

The student will understand how passenger comfort is achieved along with vehicle stability.

TEXT BOOKS:

Rajesh Rajamani, "Vehicle Dynamics and Control", 1st edition, Springer, 2005

Singiresu S. Rao, "Mechanical Vibrations", 5th Edition, Prentice Hall, 2010

Thomas D. Gillespie, "Fundamentals of Vehicle Dynamics", Society of Automotive Engineers Inc, 1992

Wong. J. Y., "Theory of Ground Vehicles", 3rd Edition, Wiley-Interscience, 2001

REFERENCES:

Dean Karnopp, "Vehicle Stability", 1st edition, Marcel Dekker, 2004

Hans B Pacejka, "Tire and Vehicle Dynamics", 2nd edition, SAE International, 2005

John C. Dixon," Tires, Suspension, and Handling", 2nd edition, Society of Automotive Engineers Inc, 1996

Jan Zuijdijk, 'Vehicle dynamics and damping", Author House, 2009

Michael Blundell & Damian Harty, "The Multibody Systems Approach to Vehicle Dynamics", Elsevier Limited, 2004

Nakhaie Jazar. G., "Vehicle Dynamics: Theory and Application", 1st edition, Springer, 2008

AT8611 COMPUTER AIDED ENGINE AND CHASSIS DESIGN LABORATORY L T P C
0 0 4 2

OBJECTIVE:

To famiarise the students to use modeling software to model engine components and chassis design

LIST OF ENGINE DESIGN EXPERIMENTS

Design and drawing of piston, piston pin and piston rings and drawing of these components.
Design of connecting rod small end and big end, shank design, design of big end cap, bolts and drawing of the connecting rod assembly.
Design of crankshaft, balancing weight calculations.
Development of short and long crank arms, front end and rear end details, drawing of the crankshaft assembly.
Design and drawing of flywheel.
Ring gear design, drawing of the flywheel including the development of ring gear teeth.
Design and drawing of the inlet and exhaust valves.
Design of cam and camshaft, cam profile generation, drawing of cam and camshaft.
Design of combustion chamber.

LIST OF CHASSIS DESIGN EXPERIMENTS

CLUTCH

Complete design of clutch components.
Assembly drawing of clutch using drafting software.

GEAR BOX

Gear train calculations.
Layout of gear box.
Calculation of bearing loads
Selection of bearings.
Assembly drawing of gear box using drafting software.

DRIVE LINE AND REAR AXLE

Design of propeller shaft.
Design details of final drive gearing.
Design details of full floating, semi-floating and three quarter floating rear shafts and rear axle housings
Design aspects of final drive.

TOTAL: 60PERIODS

OUTCOME:

Ability to use the drafty and modeling software for automobile components design

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. No.	NAME OF THE EQUIPMENT	Qty.
1	Computer nodes	15 Nos.
2	Drafting and Modeling Softwares	15 licenses each

AT8612 TWO AND THREE WHEELERS LABORATORY L T P C
0 0 4 2

OBJECTIVES:

To train the students to conduct performance test on two and three wheelers
To train the students to dismatle and assemble the gear box, steering system etc.,

LIST OF EXPERIMENTS

Performance test of a two wheeler using chassis dynamometer.
Performance test on shock absorber
Performance test on coil spring.
Two wheeler chain test
Brake and Clutch adjustment as per specification.
Dismantling and assembling of two wheeler gear box and finding gear ratios
Dismantling and assembling of three wheeler box and finding gear ratios
Three wheeler brake and clutch play adjustment
Dismantling and assembling of three wheeler steering system.
Study of three wheeler chassis frame and power transmission system.

TOTAL: 60 PERIODS

OUTCOME:

Ability to assemble the engine components and conduct performance test on two and three wheelers.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

No.	NAME OF THE EQUIPMENT	Qty.
1	Two wheeler chassis dynamometer	1 No.
2	Coil spring test rig	1 No.
3	Chain tension test rig	1 No.
4	Shock absorber test rig	1 No.
5	Two-wheeler gearbox	2 Nos.
6	Two-wheeler clutch	2 Nos.
7	Three-wheeler brake assembly	2 Nos.
8	Three-wheeler steering assembly	2 Nos.
9	Three-wheeler gear box	2 Nos.

AT8701 ENGINE AND VEHICLE MANAGEMENT SYSTEM LTPC
3 0 0 3

OBJECTIVE:

To explain the principle of engines and vehicle electronic management system and different sensors used in the systems.

UNIT I FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS 9

Microprocessor architecture, open and closed loop control strategies, PID control, Look up tables, introduction to modern control strategies like Fuzzy logic and adaptive control. Parameters to be controlled in SI and CI engines and in the other parts of the automobile.

UNIT II SENSORS 9

Inductive, Hall effect, hot wire, thermistor, piezo electric, piezoresistive, based sensors. Throttle position, mass air flow, crank shaft position, cam position, engine and wheel speed, steering position, tire pressure, brake pressure, steering torque, fuel level, crash, exhaust oxygen level (two step and linear lambda), knock, engine temperature, manifold temperature and pressure sensors, gyro sensors.

UNIT III SI ENGINE MANAGEMENT 9

Three way catalytic converter, conversion effciency versus lambda. Layout and working of SI engine management systems like Bosch L-Jetronic and LH-Jetronic. Group and sequential injection techniques. Working of the fuel system components. Cold start and warm up phases, idle speed control, acceleration and full load enrichment, deceleration fuel cutoff. Fuel control maps, open loop control of fuel injection and closed loop lambda control. Electronic ignition systems and spark timing control. Closed loop control of knock.

UNIT IV CI ENGINE MANAGEMENT 9

Fuel injection system parameters affecting combustion, noise and emissions in CI engines. Pilot, main, advanced post injection and retarded post injection. Electronically controlled Unit Injection system. Layout of the common rail fuel injection system. Working of components like fuel injector, fuel pump, rail pressure limiter, flow limiter, EGR valves

UNIT V VEHICLE MANAGEMENT SYSTEMS 9

ABS system, its need, layout and working. Electronic control of suspension – Damping control, Electric power steering, Supplementary Restraint System of air bag system – crash sensor, seat belt tightening. Cruise control. Vehicle security systems- alarms, vehicle tracking system. On board diagnostics. Collision avoidance Radar warning system.

TOTAL: 45 PERIODS

OUTCOME:

At the end of the course, the student will understand the role of various sensor, its construction and working principle and it influence in controlling pollution, enhancing safety of the vehicle.

TEXT BOOKS:

Eric Chowanietz "Automobile Electronics" SAE Publications, 1994
William B Ribbens "Understanding Automotive Electronics", SAE Publications, 1998

REFERENCES:

Robert Bosch "Diesel Engine Management" SAE Publications, 2006.
Robert Bosch, "Gasoline Engine Management" SAE Publications, 2006.

ME8692	FINITE ELEMENT ANALYSIS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To introduce the concepts of Mathematical Modeling of Engineering Problems.
To appreciate the use of FEM to a range of Engineering Problems.

UNIT I INTRODUCTION 9

Historical Background – Mathematical Modeling of field problems in Engineering – Governing Equations – Discrete and continuous models – Boundary, Initial and Eigen Value problems– Weighted Residual Methods – Variational Formulation of Boundary Value Problems – RitzTechnique – Basic concepts of the Finite Element Method.

UNIT II ONE-DIMENSIONAL PROBLEMS 9

One Dimensional Second Order Equations – Discretization – Element types- Linear and Higher order Elements – Derivation of Shape functions and Stiffness matrices and force vectors- Assembly of Matrices - Solution of problems from solid mechanics and heat transfer. Longitudinal vibration frequencies and mode shapes. Fourth Order Beam Equation –Transverse deflections and Natural frequencies of beams.

UNIT III TWO DIMENSIONAL SCALAR VARIABLE PROBLEMS 9

Second Order 2D Equations involving Scalar Variable Functions – Variational formulation –Finite Element formulation – Triangular elements – Shape functions and element matrices and vectors. Application to Field Problems - Thermal problems – Torsion of Non circular shafts –Quadrilateral elements – Higher Order Elements.

UNIT IV TWO DIMENSIONAL VECTOR VARIABLE PROBLEMS 9

Equations of elasticity – Plane stress, plane strain and axisymmetric problems – Body forces and temperature effects – Stress calculations - Plate and shell elements.

UNIT V ISOPARAMETRIC FORMULATION 9

Natural co-ordinate systems – Isoparametric elements – Shape functions for iso parametric elements – One and two dimensions – Serendipity elements – Numerical integration and application to plane stress problems - Matrix solution techniques – Solutions Techniques to Dynamic problems – Introduction to Analysis Software.

TOTAL : 45 PERIODS

OUTCOMES:

CO1 Summarize the basics of finite element formulation.
CO2 Apply finite element formulations to solve one dimensional Problems.
CO3 Apply finite element formulations to solve two dimensional Problems.
CO4 Apply finite element method to solve heat transfer and fluid mechanics problems.
CO5 Apply finite element method to solve problems on dynamic analysis.

TEXT BOOKS:

Reddy. J.N., “An Introduction to the Finite Element Method”, 3rd Edition, Tata McGraw-Hill, 2005

Seshu, P, “Text Book of Finite Element Analysis”, Prentice-Hall of India Pvt. Ltd., New Delhi, 2007.

REFERENCES:

Bhatti Asghar M, "Fundamental Finite Element Analysis and Applications", John Wiley & Sons, 2005 (Indian Reprint 2013)*

Chandrupatla & Belagundu, “Introduction to Finite Elements in Engineering”, 3rd Edition, Prentice Hall College Div, 1990

Logan, D.L., “A first course in Finite Element Method”, Thomson Asia Pvt. Ltd., 2002

Rao, S.S., “The Finite Element Method in Engineering”, 3rd Edition, Butterworth Heinemann, 2004

Robert D. Cook, David S. Malkus, Michael E. Plesha, Robert J. Witt, “Concepts and Applications of Finite Element Analysis”, 4th Edition, Wiley Student Edition, 2002.

AT8702 VEHICLE MAINTENANCE LTPC
3 0 0 3

OBJECTIVE:

To know about the various methods of maintaining vehicles and their subsystems.

UNIT I MAINTENANCE, WORKSHOP PRACTICES, SAFETY AND TOOLS 10

Maintenance – Need, importance, primary and secondary functions, policies - classification of maintenance work - vehicle insurance - basic problem diagnosis. Automotive service procedures – workshop operations – workshop manual - vehicle identification. Safety – Personnel, machines and equipment, vehicles, fire safety - First aid. Basic tools – special service tools – measuring instruments – condition checking of seals, gaskets and sealants. Scheduled maintenance services – service intervals - Towing and recovering.

UNIT II ENGINE AND ENGINE SUBSYSTEM MAINTENANCE 8

General Engine service- Dismantling of Engine components- Engine repair- working on the underside, front, top, ancillaries- Service of basic engine parts, cooling and lubricating system, fuel system, Intake and Exhaust system, electrical system - Electronic fuel injection and engine management service - fault diagnosis- servicing emission controls

UNIT III TRANSMISSION AND DRIVELINE MAINTENANCE 8

Clutch- general checks, adjustment and service- Dismantling, identifying, checking and reassembling transmission, transaxle- road testing- Removing and replacing propeller shaft, servicing of cross and yoke joint and constant velocity joints- Rear axle service points- removing axle shaft and bearings- servicing differential assemblies- fault diagnosis.

UNIT IV STEERING, BRAKE, SUSPENSION, WHEEL MAINTENANCE 10

Inspection, Maintenance and Service of Hydraulic brake, Drum brake, Disc brake, Parking brake. Bleeding of brakes. Inspection, Maintenance and Service of Mc person strut, coil spring, leaf spring, shock absorbers. Dismantling and assembly procedures. Wheel alignment and balance, removing and fitting of tyres, tyre wear and tyre rotation. Inspection, Maintenance and Service of steering linkage, steering column, Rack and pinion steering, Recirculating ball steering service- Worm type steering, power steering system

UNIT V AUTO ELECTRICAL AND AIR CONDITIOING MAINTENANCE 9

Maintenance of batteries, starting system, charging system and body electrical -Fault diagnosis using Scan tools. Maintenance of air conditioning parts like compressor, condenser, expansion valve, evaporator - Replacement of hoses- Leak detection- AC Charging- Fault diagnosis Vehicle body repair like panel beating, tinkering, soldering, polishing, painting.

TOTAL : 45 PERIODS

OUTCOME:

Upon the completion of the course, the student can able to understand the importance of maintenance and also the step by step procedure for maintain the various automotive sub systems

TEXT BOOKS:

Ed May, "Automotive Mechanics Volume One" and Two , Mc Graw Hill Publications, 2003
Vehicle Service Manuals of reputed manufacturers

REFERENCE:

1. Bosch Automotive Handbook, Sixth Edition, 2004

AT8711 ENGINE PERFORMANCE AND EMISSION TESTING LABORATORY LTPC
0 0 4 2

OBJECTIVE:

To conduct performance test and emission test on the IC engines.

LIST OF EXPERIMENTS

Study of hydraulic, electrical and eddy current dynamometers
Valve timing and port timing diagrams
Performance and emission test on two wheeler SI engine
Performance and emission test on automotive multi-cylinder SI engine
Performance and emission test on automotive multi-cylinder CI engine
Retardation test on I.C. Engines.
Heat balance test on automotive multi-cylinder SI engine
Heat balance test on automotive multi-cylinder CI engine
Morse test on multi-cylinder SI engine
Engine cylinder pressure measurement P-θ and P-V diagrams for IC engine with piezo-electric pick up, charge amplifier, angle encoder and data acquisition system.
Motoring test for indicated power

TOTAL: 60 PERIODS

OUTCOME:

Ability to control the emission and use of different equipments to conduct performance test.

LIST OF EQUIPMENT FOR A STUDENTS

Sl. No.	NAME OF THE EQUIPMENT	QUANTITY
1	Hydraulic dynamometer	1 No.
2	Eddy current dynamometer	1 No.
3	Engine test rig with electrical dynamometer	1 No.
4	Single cylinder two stroke cut section engine	1 No.
5	Single cylinder four stroke cut section engine	1 No.
6	Two-wheeler engine test rig.	1 No.
7	Automotive multicylinder SI engine test rig with heat balance arrangement	1 No.
8	Automotive multicylinder CI engine test rig with heat balance arrangement	1 No.
9	Emission Measuring Instruments for Petrol & Diesel Engines	1 No each
10	Piezo-electric pick up, Charge Amplifier, Angle Encoder and (DDAS) Digital data acquisition system	1 set

AT8712 VEHICLE MAINTENANCE LABORATORY L T P C
0 0 4 2

OBJECTIVE:

To train the structures in identifying the fault and rectification.

STUDY EXPERIMENTS:

Tools and instruments required for maintenance
Safety aspects with respect to man, machine and tools
General procedures for servicing and maintenance schedule
Wheel Alignment procedure

LIST OF EXPERIMENTS:

Minor and major tune up of gasoline and diesel engines
Calibration of Fuel pump
Engine fault diagnosis using scan tool
Fault diagnosis and service of transmission system
Fault diagnosis and service of driveline system
Fault diagnosis and service of braking system
Fault diagnosis and service of suspension system
Fault diagnosis and service of steering system
Fault diagnosis and service of Electrical system like battery, starting system, charging system, lighting system etc
Fault diagnosis and service of vehicle air conditioning system
Practice the following:
Adjustment of pedal play in clutch, brake, hand brake lever and steering wheel play.
Air bleeding from hydraulic brakes, air bleeding of diesel fuel system.
Wheel bearings tightening and adjustment.
Adjustment of head lights beam.
Removal and fitting of tire and tube.

TOTAL : 60 PERIODS

OUTCOME:

Ability to identify the faults and knowledge on maintenance

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

Sl. No.	NAME OF THE EQUIPMENT	Qty.
1	Engine Analyzer	1 No.
2	Cylinder compression pressure gauge	1 No.
3	Vacuum gauge	1 No.
4	Spark plug cleaner and tester	1 No.
5	Cam angle and rpm tester	1 No.
6	Tachometer	1 No.
7	Wheel alignment apparatus	1 No.
8	Gas welding equipment	1 No.
9	Tyre remover	1 No.
10	Bearing puller	1 No.
11	Head light alignment gauge	1 No.
12	Service manuals of petrol, diesel engines	1 No: each
13	Cylinder reboring machine	1 No.
14	Valve grinding machine	1 No.
15	Valve lapping machine	1 No.
16	Fuel injection calibration test bench with nozzle tester	1 No.
17	HRD tester, Clamp on meter, Hydrometer	1 No: each

AT8801 VEHICLE BODY ENGINEERING L T P C
3 0 0 3

OBJECTIVE:

The main objective of this course is to impart knowledge in the construction of vehicle, aerodynamic, concept, paneling of passenger car body trim. At the end of the course the student will be well versed in the design and construction of external body of the vehicles.

UNIT I CAR BODY DETAILS 10

Types of Car body - Saloon, convertibles, Limousine, Estate Van, Racing and Sports car – Visibility-regulations, driver,s visibility, improvement in visibility and tests for visibility. Driver seat design -Car body construction-Various panels in car bodies. Safety aspect of car body.

UNIT II BUS BODY DETAILS 9

Types of bus body: based on capacity, distance traveled and based on construction.– Bus body lay out for various types, Types of metal sections used – Regulations – Constructional details: Conventional and integral. driver seat design- Safety aspect of bus body.

UNIT III COMMERCIAL VEHICLE DETAILS 8

Types of commercial vehicle bodies - Light commercial vehicle body. Construction details of commercial vehicle body - Flat platform body, Trailer, Tipper body and Tanker body – Dimensions of driver,s seat in relation to controls – Drivers cab design - Regulations.

UNIT IV VEHICLE AERODYNAMICS 9

Objectives, Vehicle drag and types. Various types of forces and moments. Effects of forces and moments. Side wind effects on forces and moments. Various body optimization techniques for minimum drag. Wind tunnels – Principle of operation, Types. Wind tunnel testing such as: Flow visualization techniques, Airflow management test – measurement of various forces and moments by using wind tunnel.

UNIT V BODY MATERIALS, TRIM, MECHANISMS AND BODY REPAIR 9

Types of materials used in body construction-Steel sheet, timber, plastics, GRP, properties of materials. Body trim items-body mechanisms.Hand tools-power tools-panel repair-repairing sheet metal-repairing plastics-body fillers-passenger compartment service- corrosion: Anticorrosion methods, Modern painting process procedure-paint problems

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the course, students will

Know about different aspects of car body and bus body, types, commercial vehicle.
Role of various aerodynamic forces and moments, measuring instruments
Know about the material used in body building, tools used, body repairs.

TEXT BOOKS:

James E Duffy, "Body Repair Technology for 4-Wheelers", Cengage Learning, 2009.
Powloski, J., "Vehicle Body Engineering", Business Books Ltd., 1998.

REFERENCES:

Braithwaite, J.B., "Vehicle Body building and drawing", Heinemann Educational Books Ltd., London, 1997.
Dieler Anselm., The passenger car body, SAE International, 2000
Giles, G.J., "Body construction and design", Illiffe Books Butterworth & Co., 1991.
John Fenton, "Vehicle Body layout and analysis", Mechanical Engg. Publication Ltd., London, 1992.

AT8811 **PROJECT WORK** **L T P C**
0 0 20 10

OBJECTIVE:

To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 300 PERIODS

OUTCOME:

On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

AT8001 **AUTOMOTIVE AIR-CONDITIONING** **LTPC**
3 0 0 3

OBJECTIVE:

At the end of the course, the students will be able to understand the components of the automotive air-conditioning and their functions and the latest developments in this field.

UNIT I AUTOMOTIVE AIRCONDITIONING FUNDAMENTALS 9

Purposes of Heating, Ventilation and Air Conditioning- Environmental Concerns- Ozone layer depletion- Location of air conditioning components in a car – Schematic layout of a vehicle refrigeration system. Psychrometry – Basic terminology and Psychrometric mixtures- Psychrometric Chart- Related problems

UNIT II AUTOMOTIVE COOLING AND HEATING SYSTEM 9

Vehicle Refrigeration System and related problems- Fixed thermostatic and Orifice tube system- Variable displacement thermostatic and Orifice tube system- Vehicle air conditioning operation
Types of compressor- Compressor Clutches- Compressor Clutch electrical circuit- Compressor lubrication- Condensers- Evaporators- Expansion devices- Evaporator temperature and pressure controls- receiver-drier- Accumulators- refrigerant hoses, Connections and other assemblies- Heating system

UNIT III AIR-CONDITIOING CONTROLS, DELIVERY SYSTEM AND REFRIGERANTS 9

Types of Control devices- Preventing Compressor damage- Preventing damage to other systems- Maintaining driveability- Preventing Overheating
Ram air ventilation- Air delivery Components- Control devices- Vacuum Controls
Containers – Handling refrigerants – Discharging, Charging & Leak detection – Refrigeration system diagnosis – Diagnostic procedure – Ambient conditions affecting system pressures.

UNIT IV AUTOMATIC TEMPERATURE CONTROL 9

Different types of sensors and actuators used in automatic temperature control- Fixed and variable displacement temperature control- Semi Automatic- Controller design for Fixed and variable displacement type air conditioning system

UNIT V SYSTEM SERVICING AND TESTING 9

Special tools for servicing vehicle air conditioning – Diagnosing components and air conditioning systems- Diagnosing cooling system- Air delivery system- Automatic temperature Control system diagnosis and service

TOTAL : 45 PERIODS

OUTCOME

Upon the completion of the course, the student should understand the basic of vehicle air-conditioning system, its components, working principle, control mechanism, service etc.

TEXT BOOKS:

Warren Farnell and James D.Halderman, "Automotive Heating, Ventilation, and Air Conditioning systems", Classroom Manual, Pearson Prentice Hall, 2004

Warren Farnell and James D.Halderman, "Automotive Heating, Ventilation, and Air Conditioning systems", Shop Manual, Pearson Prentice Hall, 2004

William H Crouse and Donald L Anglin, "Automotive Air conditioning", McGraw Hill Inc., 1990.

REFERENCES:

Goings,L.F., "Automotive Air Conditioning", American Technical services, 1974.

Mitchell Information Services, Inc., "Mitchell Automatic Heating and Air Conditioning Systems", Prentice Hall Inc., 1989.

McDonald,K.L., "Automotive Air Conditioning", Theodore Audel series, 1978.

Paul Weisler, "Automotive Air Conditioing", Reston Publishing Co. Inc., 1990.

AT8002 ADVANCE THEORY OF IC ENGINES LTPC

3 0 0 3

OBJECTIVES:

Knowledge in usage of software for simulating the performance of IC engines

Acquiring ability to simulate the various types combustion processes of IC engines.

Knowledge in performance simulation of IC engines.

UNIT I COMBUSTION OF FUELS 9

Chemical composition and molecular structure of hydrocarbon fuels. Combustion Stoichiometry of hydrocarbon fuels – Chemical energy and heat of reaction calculations – Chemical equilibrium and adiabatic flame temperature calculation. Theory of SI and CI engine combustion – Flame velocity and area of flame front. Fuel spray characteristics – droplet size, depth of penetration and atomization.

UNIT II ENGINE CYCLE ANALYSIS 8

Ideal air, fuel air cycle and actual cycle analysis. Progressive combustion analysis in SI engines. Parametric studies on work output, efficiency and other engine performance.

UNIT III COMBUSTION MODELLING 10

Basic concepts of engine simulation – Governing equations, Classification of engine models- Thermodynamic models for Intake and exhaust flow process – Quasi steady flow - Filling and emptying - Gas dynamic Models. Thermodynamic based in cylinder models for SI engine and CI engines.

UNIT IV NON-CONVENTIONAL IC ENGINES 9

Concept of L.H.R. engine and its recent developments. Variable compression ratio engine and its use in engine research. Wankel rotary combustion engine. Dual fuel engine concept for multi fuel usage in CI engines - performance studies on dual fuel engine. Free piston engine. Stratified charge and lean burn engines . Locomotive and marine engines.

UNIT V COMBUSTION ANALYSIS IN IC ENGINES 9

Photographic studies of combustion processes – Analysis of Pressure crank angle diagrams in SI and CI engines. Knock study for Pressure crank angle histories. Apparent heat release rate and Wiebe,s law analysis for combustion. Calculation of Ignition delay and combustion duration. – Hot wire and laser Doppler anemometry and velocimetry for flow and combustion analysis in IC engines.

TOTAL : 45 PERIODS

OUTCOME:

At the end of the course, the student can able to model and simulate the engine cycle, perform combustion analysis, instruments used in measurement, recent developments in the IC engines.

TEXT BOOKS:

Ganesan,V., "Internal combustion engines", Tata McGraw Hill Publishing Co., 1994.
Ganesan.V. "Computer Simulation of spark ignition engine process", Universities Press (I) Ltd, Hyderbad, 1996.

REFERENCES:

Benson,R.S., Whitehouse,N.D., "Internal Combustion Engines", Pergamon Press, Oxford, 1979.
Ganesan,V., "Compute Simulation of Compression Ignition engine process", Universities Press (India) Ltd., Hyderabad, 1996.
John,B., Heywood, "Internal Combustion Engine Fundamentals", McGraw Hill Publishing Co., New York, 1990.
Ramalingam. K.K., "Internal combustion engine", scitech publications, Chennai, 2003.

AT8003 METROLOGY AND MEASUREMENTS FOR AUTOMOBILE ENGINEERS L T P C 3 0 0 3

OBJECTIVE :

Knowledge in usage of software to measure parameters like speed, position, velocity, pressure, force, torque, temperature etc

UNIT I INTRODUCTION TO MEASUREMENTS AND SENSORS 9

Sensors: Functions- Classifications- Main technical requirement and trends Units and standards- Calibration methods- Classification of errors- Error analysis- Limiting error- Probable error- Propagation of error- Odds and uncertainty- principle of transduction- Classification.

Static characteristics- mathematical model of transducers- Zero, First and Second order transducers- Dynamic characteristics of first and second order transducers for standard test inputs.

UNIT II VARIABLE RESISTANCE, INDUCTANCE AND CAPACITIVE SENSOR 11

Principle of operation- Construction details- Characteristics and applications of resistive potentiometer- Strain gauges- Resistive thermometers- Thermistors- Piezoresistive sensors Inductive potentiometer- Variable reluctance transducers:- EI pick up and LVDT

SPECIAL SENSORS

Variable air gap type, variable area type and variable permittivity type- capacitor microphone Piezoelectric, Magnetostrictive, Hall Effect, semiconductor sensor- digital transducers-Humidity Sensor. Rain sensor, climatic condition sensor, solar, light sensor, antiglare sensor.

UNIT III AUTOMOTIVE PRESSURE AND FORCE/TORQUE SENSOR 9

Pressure Sensor:

Typical automotive applications- Thick film pressure sensor- Semiconductor pressure sensor- Integrated silicon intake-manifold pressure sensor-Integrated silicon combustion-pressure sensor-Piezo electric sensor-High pressure sensor with metal diaphragm.

Force/Torque Sensor:

Typical automotive applications- Magneto elastic bearing-pin sensor- Magneto elastic tension/compressive-force sensor – Basic principle of torque measurement – steering- Angle measuring torque sensor

UNIT IV AUTOMOTIVE POSITION AND RPM/VELOCITY SENSORS 9

Position Sensors:- Typical automotive applications- Wiper potentiometers- Short-circuiting ring sensor- Half-differential sensor- Eddy-current pedal-travel sensor- Integrated Hall IC,s - Hall acceleration sensor- Knock sensors-RPM and Velocity Sensors: - Inductive rotational speed sensor-Hall effect sensor

Temperature Sensors:- Typical automotive applications -Sintered-Ceramic resistors-Thin film resistors-Thick film resistors- Monocrystalline silicon semiconductor resistor- Thermopile sensors

Flow Sensors:- Ultrasonic flow sensors-Pitot tube air-flow sensor- Hot wire air-mass flow meter-Micro mechanical hot-film air-mass flow meter- Lambda sensor -Imaging sensor-Rain Sensor Introduction to MEMs

UNIT V METROLOGY 7

Basic concept - scientific, industrial and legal metrology - linear and angular measuring instruments, measurement of screw thread - Two, three wire method, measurement with optical flats, laser inter ferometer, coordinate measuring machine.

TOTAL : 45 PERIODS

OUTCOME:

At the end of the course, the students will aware the various instruments that are available to measure parameters like speed, position, velocity, pressure, force, torque, temperature etc.

TEXT BOOKS:

Doeblin E.O, “Measurement Systems : Applications and Design”, 5th Edition, Tat McGraw-Hill Publishing Co,2007

Robert Brandy, “ Automotive Electronics and Computer System”, Prentice Hall, 2001

William Kimberley,” Bosch Automotive Handbook”, 6th Edition, Robert Bosch GmbH, 2004

REFERENCES:

Bentley J.P ,” Principles of Measurement Systems”, 4th Edition, Addision Wesley Longman Ltd., U.K, 2004

Jain R. K. “Engineering Metrology” Khanna Publishers, New Delhi, 2012

Murthy D.V.S, “Transducers and Instrumentation”, Prentice Hall of India, 2007

Neubert H.K.P.,” Instrument Transducers- An Introduction to their Performance and Design” , Oxford University Press, Cambridge, 2003

Patranabis.D, “ Sensors and Transducers”, 2nd Edition, Prentice Hall India Ltd, 2003

PR8072 **NEW PRODUCT DEVELOPMENT** **L T P C**
3 0 0 3

OBJECTIVES:

This course aims at introducing the students to the basic concepts of engineering design and product development with focus on the front end processes.

At the end of this course the student is expected to demonstrate an understanding of the overview of all the product development processes and knowledge of concept generation and selection tools.

UNIT I INTRODUCTION **9**

Need for developing products – the importance of engineering design – types of design –the design process – relevance of product lifecycle issues in design –designing to codes and standards- societal considerations in engineering design –generic product development process – various phases of product development-planning for products –establishing markets- market segments- relevance of market research

UNIT II CUSTOMER NEEDS **9**

Identifying customer needs –voice of customer –customer populations- hierarchy of human needs-need gathering methods – affinity diagrams – needs importance- establishing engineering characteristics-competitive benchmarking- quality function deployment- house of quality- product design specification-case studies

UNIT III CREATIVE THINKING **9**

Creative thinking –creativity and problem solving- creative thinking methods- generating design concepts-systematic methods for designing –functional decomposition – physical decomposition – functional representation –morphological methods-TRIZ- axiomatic design

UNIT IV DECISION MAKING AND PRODUCT ARCHITECTURE **9**

Decision making –decision theory –utility theory –decision trees –concept evaluation methods –Pugh concept selection method- weighted decision matrix –analytic hierarchy process – introduction to embodiment design –product architecture – types of modular architecture –steps in developing product architecture

UNIT V DESIGN AND COST ANALYSIS **9**

Industrial design – human factors design –user friendly design – design for serviceability – design for environment – prototyping and testing – cost evaluation –categories of cost – overhead costs – activity based costing –methods of developing cost estimates – manufacturing cost –value analysis in costing

TOTAL: 45 PERIODS

TEXT BOOKS

Anita Goyal, Karl T Ulrich, Steven D Eppinger, “Product Design and Development “, 4th Edition, 2009, Tata McGraw-Hill Education, ISBN-10-007-14679-9

Kevin Otto, Kristin Wood, “Product Design”, Indian Reprint 2015, Pearson Education,ISBN 9788177588217

REFERENCES

Clive L.Dym, Patrick Little, “Engineering Design: A Project-based Introduction”, 3rd Edition, John Wiley & Sons, 2009, ISBN 978-0-470-22596-7.

George E.Dieter, Linda C.Schmidt, “Engineering Design”, McGraw-Hill International Edition, 4th Edition, 2009, ISBN 978-007-127189-9.

Yousef Haik, T. M. M. Shahin, “Engineering Design Process”, 2nd Edition Reprint, Cengage Learning, 2010, ISBN 0495668141

GE8075 INTELLECTUAL PROPERTY RIGHTS LTPC
3003

OBJECTIVE:

To give an idea about IPR, registration and its enforcement.

UNIT I INTRODUCTION 9

Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II REGISTRATION OF IPRs 10

Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad

UNIT III AGREEMENTS AND LEGISLATIONS 10

International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT IV DIGITAL PRODUCTS AND LAW 9

Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection – Unfair Competition – Meaning and Relationship between Unfair Competition and IP Laws – Case Studies.

UNIT V ENFORCEMENT OF IPRs 7

Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

TOTAL :45 PERIODS

OUTCOME:

Ability to manage Intellectual Property portfolio to enhance the value of the firm.

TEXT BOOKS

S.V. Satarkar, Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002

V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012

REFERENCES

Deborah E. Bouchoux, “Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets”, Cengage Learning, Third Edition, 2012.

Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

Prabuddha Ganguli,”Intellectual Property Rights: Unleashing the Knowledge Economy”, McGraw Hill Education, 2011.

GE8073 FUNDAMENTALS OF NANOSCIENCE L T P C
3 0 0 3

OBJECTIVE:
To learn about basis of nanomaterial science, preparation method, types and application

UNIT I INTRODUCTION 8
Nanoscale Science and Technology - Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II GENERAL METHODS OF PREPARATION 9
Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III NANOMATERIALS 12
Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications- Nanometal oxides-ZnO, TiO2,MgO, ZrO2, NiO, nanoalumina, CaO, AgTiO2, Ferrites, Nanoclays-functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

UNIT IV CHARACTERIZATION TECHNIQUES 9
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation.

UNIT V APPLICATIONS 7
NanoInfoTech: Information storage- nanocomputer, molecular switch, super chip, nanocrystal, Nanobiotechlogy: nanoprobes in medical diagnostics and biotechnology, Nano medicines, Targetted drug delivery, Bioimaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nanosensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sunbarrier products - In Photostat, printing, solar cell, battery.

TOTAL : 45 PERIODS

OUTCOMES:
Will familiarize about the science of nanomaterials
Will demonstrate the preparation of nanomaterials
Will develop knowledge in characteristic nanomaterial

TEXT BOOKS :
A.S. Edelstein and R.C. Cammearata, eds., “Nanomaterials: Synthesis, Properties and Applications”, Institute of Physics Publishing, Bristol and Philadelphia, 1996.
N John Dinardo, “Nanoscale Characterisation of surfaces & Interfaces”, 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000.

REFERENCES:
Akhlesh Lakhtakia,“The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations”. Prentice-Hall of India (P) Ltd, New Delhi, 2007.
G Timp, “Nanotechnology”, AIP press/Springer, 1999.

AT8091 MANUFACTURING OF AUTOMOTIVE COMPONENTS L T P C
3003

OBJECTIVE:

To impart knowledge on basic principle and production methods of automotive components.

UNIT I CASTED ENGINE COMPONENTS 9

Material selection and Manufacturing methods for Piston, Piston rings, Cylinder block, wet and dry liners, Engine head, Oil pan, Carburetors. Thermal barrier coating of Engine head and valves.

UNIT II FORGED ENGINE COMPONENTS 8

Material selection and Manufacturing methods for Crank shaft, Connecting rod, Cam shaft, valve, Piston pin, Push rod, Rocker arm, tappets, spark plug.

UNIT III TRANSMISSION SYSTEM 10

Material selection and Manufacturing methods for Clutch – Clutch lining – Gear Box – Gear – Propeller Shaft – Differential – Axle Shaft – Bearing – fasteners – Wheel drum.

Methods of Gear manufacture – Gear hobbing and gear shaping machines - gear generation - gear finishing and shaving – Grinding and lapping of hobs and shaping cutters – gear honing – gear broaching.

UNIT IV VEHICLE CHASSIS 8

Material selection and manufacturing methods for chassis, dead axle, leaf spring, coil spring and shock absorbers – wheel housing – steering system, Brake shoes, wheel rim, Tyres. Heat treatment procedures.

UNIT V RECENT DEVELOPMENTS 10

Surface treatment – Plastics – Plastics in Automobile vehicles – Processing of plastics - Emission control system – catalytic converter – Hydro forming of exhaust manifold and lamp housing – stretch forming of Auto body panels – MMC liners –Selection of materials for Auto components. Use of Robots in Body weldment.

TOTAL : 45 PERIODS

OUTCOME:

Upon completion of this course the student can able to use the basic principle and production methods of automotive components

TEXT BOOK:

1. Heldt.P.M, "High speed combustion engines", Oxford publishing Co., New York, 1990.

REFERENCES:

Gupta K.M. "Automobile Engineering" Vol.I & II, Umesh Publishers, 2000.
Kirpal Singh, 'Automobile Engineering", Vol. I & II, Standard Publishers, New Delhi, 1997.
Newton and steels, the motor vehicle, ELBS, 1990
Serope Kalpakjian and Steven R. Schmid, "Manufacturing Processes for Engineering Materials", Fourth Edition, Pearson Education publications – 2003

AT8004 NEW GENERATION AND HYBRID VEHICLES L T P C
3 0 0 3

OBJECTIVE:

To illustrate the new generation vehicles and their operation and controls

UNIT I INTRODUCTION 7

Electric and hybrid vehicles, flexible fuel vehicles (FFV), solar powered vehicles, vehicles, fuel cells vehicles.

UNIT II POWER SYSTEM AND NEW GENERATION VEHICLES 12

Hybrid Vehicle engines, Stratified charge engines, learn burn engines, low heat rejection engines, hydrogen engines, HCCI engine, VCR engine, surface ignition engines, VVTI engines. High energy and power density batteries, fuel cells, flexible fuel systems.

UNIT III VEHICLE OPERATION AND CONTROL 9

Computer Control for pollution and noise control and for fuel economy – Transducers and actuators - Information technology for receiving proper information and operation of the vehicle like optimum speed and direction.

UNIT IV VEHICLE AUTOMATED TRACKS 9

Preparation and maintenance of proper road network - National highway network with automated roads and vehicles - Satellite control of vehicle operation for safe and fast travel, GPS.

UNIT V SUSPENSION, BRAKES, AERODYNAMICS AND SAFETY 8

Air suspension – Closed loop suspension, compensated suspension, anti skid braking system, retarders, regenerative braking, safety gauge air bags- crash resistance. Aerodynamics for modern vehicles, safety systems, materials and standards.

TOTAL: 45 PERIODS

OUTCOME:

Upon completion of this course the student will familiar in the recent development pertain to energy system, vehicle operation, newer vehicle, recent technologies in the area of suspension systems, brakes, aerodynamics etc

TEXT BOOKS:

Bosch Hand Book, SAE Publication, 2000
Heinz, "Modern Vehicle Technology" Second Edition

REFERENCES:

Advance hybrid vehicle power transmission, SAE.
Light weight electric for hybrid vehicle design.
Noise reduction, Branek L.L., McGraw Hill Book company, New York, 1993.

AT8005 AUTOMOTIVE AERODYNAMICS L T P C
3 0 0 3

OBJECTIVE:

At the end of the course, the students will be able to apply basic principles of aerodynamics for the design of vehicle body.

UNIT I INTRODUCTION 9

Scope, historical developments, fundamental of fluid mechanics, flow phenomenon related to vehicles, external and internal flow problem, resistance to vehicle motion, performance, fuel consumption and performance potential of vehicle aerodynamics.

UNIT II AERODYNAMIC DRAG OF CARS 9

Cars as a bluff body, flow field around car, drag force, types of drag force, analysis of aerodynamic drag, drag coefficient of cars, strategies for aerodynamic development, low drag profiles.

UNIT III SHAPE OPTIMIZATION OF CARS 9

Front end modification, front and rear wind shield angle, boat tailing, hatch back, fast back and square back, dust flow patterns at the rear, effects of gap configuration, effect of fasteners. Case studies on modern vehicles.

UNIT IV VEHICLE HANDLING 9

The origin of forces and moments on a vehicle, lateral stability problems, methods to calculate forces and moments – vehicle dynamics under side winds, the effects of forces and moments, characteristics of forces and moments, dirt accumulation on the vehicle, wind noise, drag reduction in commercial vehicles and racing cars.

UNIT V WIND TUNNELS FOR AUTOMOTIVE AERODYNAMICS 9

Introduction, principle of wind tunnel technology, limitation of simulation, stress with scale models, full scale wind tunnels, measurement techniques, equipment and transducers, road testing methods, numerical methods. CFD analysis.

TOTAL : 45 PERIODS

OUTCOME:

Upon completion of this course, the students will understand the fundamentals of aerodyanmics, vehicle body optimisation, measuring aerodynamics forces etc.

TEXT BOOK:

Hucho .W.H., “Aerodynamic of Road Vehicles”, Butterworths Co., Ltd., 1997

REFERENCES :

A. Pope, “Wind Tunnel Testing”, 2nd Edition, John Wiley & Sons New York, 1974.
“Automotive Aerodynamic”, Update SP-706, Society of Automotive Engineers Inc,1987
“Vehicle Aerodynamics”, SP-1145, Society of Automotive Engineers Inc ,1996.

AT8006 **OFF ROAD VEHICLES** **LTPC**
3 0 0 3

OBJECTIVE:

At the end of the course, the students will be able to understand the various Off road vehicle and their systems and features

UNIT I CLASSIFICATION AND REQUIREMENTS OF OFF ROAD VEHICLES 6

Construction layout, capacity and applications of off road vehicle - prime mover, chassis and transmission, Multiaxle vehicles.

UNIT II EARTH MOVING CONSTRUCTIONAL MACHINES 10

dumpers - safety features, safe warning system for dumper , Design aspects on dumper body, Articulated Dumpers, loaders - single bucket, Multi bucket and rotary types - bulldozers, kinematics for loader and bulldozers with operational linkages, excavators, backhoe loaders, scrappers, motor graders, power shawl, bush cutters, Bush cutters, stumpers, rippers.

UNITY III INDUSTRIAL APPLICATIONS 10

Constructional and working details of Jib crane, concrete ready mixers, compactors - vibratory compactors, forklift, utility vehicles, man - lift, scissors, lift trucks, material handlers, power generators.

UNIT IV FARM EQUIPMENTS, MILITARY AND COMBAT VEHICLES 8

Tractors, classification - working attachments, power take off, special implements, paddy harvester, sugarcane harvester, feller bunchers, special features and constructional details of military tankers, AVLB gun carriers and transport vehicles.

UNIT V VEHICLE SYSTEMS , FEATURES 11

Brake system and actuation – OCDB and dry disc caliper brakes. Body hoist and bucket operational hydraulics. Hydro-pneumatic suspension cylinders. Power steering system. Articulated steering assembly - power and capacity of earth moving machines.

TOTAL: 45 PERIODS

OUTCOME:

At the end of the course, the students will understand the types, special features, design methodology, working principle, application of various off – road vehicles.

TEXT BOOKS:

Abrosimov.K. Bran berg.A and Katayer.K., "Road making machinery", MIR Publishers, Moscow, 1971.

Nakra C.P., “Farm machines and equipments” Dhanparai Publishing company Pvt. Ltd.

Robert L Peurifoy, “Construction, planning, equipment and methods” Tata McGraw Hill Publishing company Ltd.

SAE Handbook Vol. III., Society of Automotive Engineers, 1997

Wong.J.T., "Theory of Ground Vehicles”, John Wiley & Sons, New York, 1987.

REFERENCES:

Bart H Vanderveen, "Tanks and Transport Vehicles", Frederic Warne and Co Ltd., London.Ia. S. Ageikin, “Off the Road Wheeled and Combined Traction Devices: Theory and Calculation”, Ashgate Publishing Co. Ltd. 1988.

Schulz Erich.J, "Diesel equipment I & II", McGraw Hill company, London, 1982.

Satyanarayana. B., "Construction planning and equipment", standard publishers and distributors, New Delhi, 1985.

MG8491 **OPERATIONS RESEARCH** **L T P C**

3003

OBJECTIVE:

To provide knowledge and training in using optimization techniques under limited resources for the engineering and business problems.

UNIT I LINEAR MODELS **15**

The phase of an operation research study – Linear programming – Graphical method– Simplex algorithm – Duality formulation – Sensitivity analysis.

UNIT II TRANSPORTATION MODELS AND NETWORK MODELS **8**

Transportation Assignment Models –Traveling Salesman problem-Networks models – Shortest route – Minimal spanning tree – Maximum flow models –Project network – CPM and PERT networks – Critical path scheduling – Sequencing models.

UNIT III INVENTORY MODELS **6**

Inventory models – Economic order quantity models – Quantity discount models – Stochastic inventory models – Multi product models – Inventory control models in practice.

UNIT IV QUEUEING MODELS **6**

Queueing models - Queueing systems and structures – Notation parameter – Single server and multi server models – Poisson input – Exponential service – Constant rate service – Infinite population – Simulation.

UNIT V DECISION MODELS **10**

Decision models – Game theory – Two person zero sum games – Graphical solution- Algebraic solution– Linear Programming solution – Replacement models – Models based on service life – Economic life– Single / Multi variable search technique – Dynamic Programming – Simple Problem.

TOTAL: 45 PERIODS

OUTCOME:

Upon completion of this course, the students can able to use the optimization techniques for use engineering and Business problems

TEXT BOOKS:

Hillier and Libeberman, “Operations Research”, Holden Day, 2005

Taha H.A., “Operations Research”, Sixth Edition, Prentice Hall of India, 2003.

REFERENCES:

Bazara M.J., Jarvis and Sherali H., “Linear Programming and Network Flows”, John Wiley, 2009.

Budnick F.S., “Principles of Operations Research for Management”, Richard D Irwin, 1990.

Philip D.T. and Ravindran A., “Operations Research”, John Wiley, 1992.

Shennoy G.V. and Srivastava U.K., “Operation Research for Management”, Wiley Eastern, 1994.

Tulsian and Pasdey V., “Quantitative Techniques”, Pearson Asia, 2002.

GE8071 DISASTER MANAGEMENT LT PC 3003

OBJECTIVES:

To provide students an exposure to disasters, their significance and types.

To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction

To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)

To enhance awareness of institutional processes in the country and

To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don,ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions / Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9 Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

Differentiate the types of disasters, causes and their impact on environment and society

Assess vulnerability and various methods of risk reduction measures as well as mitigation.

Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

TEXT BOOKS:

Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011

Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423

Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]

REFERENCES

Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005

Government of India, National Disaster Management Policy,2009.

AT8007 NOISE, VIBRATION AND MEASUREMENTS LTPC

3 0 0 3

OBJECTIVES:

knowledge in basic of vibration and noise

Understanding the effect of noise an human comfort and environment

Knowing the methods of vibration and noise measurement.

UNIT I FUNDAMENTALS OF ACOUSTICS AND NOISE, VIBRATION 8

Theory of Sound—Predictions and Measurement, Sound Sources, Sound Propagation in the Atmosphere, Sound Radiation from Structures and Their Response to Sound, General Introduction to Vibration, Vibration of Simple Discrete and Continuous Systems, Random Vibration, Response of Systems to Shock, Passive Damping

UNIT II EFFECTS OF NOISE, BLAST, VIBRATION, AND SHOCK ON PEOPLE 7

General Introduction to Noise and Vibration Effects on People and Hearing Conservation, Sleep Disturbance due to Transportation Noise Exposure, Noise-Induced Annoyance, Effects of Infrasound, Low-Frequency Noise, and Ultrasound on People, Auditory Hazards of Impulse and Impact Noise, Effects of Intense Noise on People and Hearing Loss, Effects of Vibration on People, Effects of Mechanical Shock on People, Rating Measures, Descriptors, Criteria, and Procedures for Determining Human Response to Noise.

UNIT III TRANSPORTATION NOISE AND VIBRATION—SOURCES, PREDICTION, AND CONTROL 10

Introduction to Transportation Noise and Vibration Sources, Internal Combustion Engine Noise Prediction and Control—Diesel, Exhaust and Intake Noise and Acoustical Design of Mufflers, Tire/Road Noise—Generation, Measurement, and Abatement, Aerodynamic Sound Sources in Vehicles—Prediction and Control, Transmission and Gearbox Noise and Vibration Prediction and Control, Brake Noise Prediction and Control.

UNIT IV INTERIOR TRANSPORTATION NOISE AND VIBRATION SOURCES - PREDICTION AND CONTROL 10

Introduction to Interior Transportation Noise and Vibration Sources, Automobile, Bus, and Truck Interior Noise and Vibration Prediction and Control, Noise and Vibration in Off-Road Vehicle Interiors-Prediction and Control,

UNIT V NOISE AND VIBRATION TRANSDUCERS, ANALYSIS EQUIPMENT, SIGNAL PROCESSING, AND MEASURING TECHNIQUES 10

General Introduction to Noise and Vibration Transducers, Measuring Equipment, Measurements, Signal Acquisition, and Processing, Acoustical Transducer Principles and Types of Microphones, Vibration Transducer Principles and Types of Vibration Transducers, Sound Level Meters, Noise Dosimeters, Analyzers and Signal Generators, Equipment for Data Acquisition, Noise and Vibration Measurements, Determination of Sound Power Level and Emission Sound Pressure Level, Sound Intensity Measurements, Noise and Vibration Data Analysis, Calibration of Measurement Microphones, Calibration of Shock and Vibration Transducers, Metrology and Traceability of Vibration and Shock Measurements.

TOTAL : 45 PERIODS

OUTCOME:

At the end of the course, the student will understand the sources, effects, prediction, control techniques, measurement techniques of noise, vibration pertain to an automobile.

TEXT BOOKS:

Clarence W. de Silva , "Vibration Monitoring, Testing, and Instrumentation ",CRC Press, 2007

David A.Bies and Colin H.Hansen "Engineering Noise Control: Theory and Practice "Spon Press, London, 2009

REFERENCES:

Allan G. Piersol ,Thomas L. Paez "Harris, Shock and Vibration Handbook", McGraw-Hill , New Delhi, 2010

Colin H Hansen "Understanding Active Noise Cancellation" , Spon Press , London 2003

Matthew Harrison "Vehicle Refinement: Controlling Noise and Vibration in Road Vehicles ", Elsevier Butterworth-Heinemann, Burlington, 2004

PR8071 LEAN SIX SIGMA L T P C
3003

OBJECTIVE:

To gain insights about the importance of lean manufacturing and six sigma practices.

UNIT I LEAN & SIX SIGMA BACKGROUND AND FUNDAMENTALS 9

Historical Overview – Definition of quality – What is six sigma -TQM and Six sigma - lean manufacturing and six sigma- six sigma and process tolerance – Six sigma and cultural changes – six sigma capability – six sigma need assessments - implications of quality levels, Cost of Poor Quality (COPQ), Cost of Doing Nothing – assessment questions

UNIT II THE SCOPE OF TOOLS AND TECHNIQUES 9

Tools for definition – IPO diagram, SIPOC diagram, Flow diagram, CTQ Tree, Project Charter – Tools for measurement – Check sheets, Histograms, Run Charts, Scatter Diagrams, Cause and effect diagram, Pareto charts, Control charts, Flow process charts, Process Capability Measurement, Tools for analysis – Process Mapping, Regression analysis, RU/CS analysis, SWOT, PESTLE, Five Whys, interrelationship diagram, overall equipment effectiveness, TRIZ innovative problem solving – Tools for improvement – Affinity diagram, Normal group technique, SMED, 5S, mistake proofing, Value stream Mapping, forced field analysis – Tools for control

– Gantt chart, Activity network diagram, Radar chart, PDCA cycle, Milestone tracker diagram, Earned value management.

UNIT III SIX SIGMA METHODOLOGIES 9

Design For Six Sigma (DFSS),Design For Six Sigma Method - Failure Mode Effect Analysis (FMEA), FMEA process - Risk Priority Number (RPN)- Six Sigma and Leadership, committed leadership – Change Acceleration Process (CAP)- Developing communication plan – Stakeholder.

UNIT IV SIX SIGMA IMPLEMENTATION AND CHALLENGES 9

Tools for implementation – Supplier Input Process Output Customer (SIPOC) – Quality Function Deployment or House of Quality (QFD) – alternative approach –implementation – leadership training, close communication system, project selection – project management and team – champion training – customer quality index – challenges – program failure, CPQ vs six sigma, structure the deployment of six sigma – cultural challenge – customer/internal metrics.

UNIT V EVALUATION AND CONTINUOUS IMPROVEMENT METHODS 9

Evaluation strategy – the economics of six sigma quality, Return on six Sigma (ROSS), ROI , poor project estimates – continuous improvement – lean manufacturing – value, customer focus, Perfection, focus on waste, overproduction – waiting, inventory in process (IIP), processing waste, transportation, motion, making defective products, underutilizing people – Kaizen – 5S.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course student can able to

Understand the fundamentals of Lean and Six sigma.
Understand the tools and techniques used in analysis.
Understand the six sigma methodologies.
Understand the implementation and challenges in six sigma.
Understand the evaluation and continuous improvement methods.

REFERENCES:

Forrest W. Breyfogle, III, James M. Cupello, Becki Meadows, Managing Six Sigma:A Practical
Fred Soleimannejed , Six Sigma, Basic Steps and Implementation, AuthorHouse, 2004
Guide to Understanding, Assessing, and Implementing the Strategy That Yields Bottom-Line
James P. Womack, Daniel T.Jones, Lean Thinking, Free Press Business, 2003
Michael L.George, David Rownalds, Bill Kastle, What is Lean Six Sigma, McGraw – Hill 2003
Success, John Wiley & Sons, 2000
Thomas Pyzdek, The Six Sigma Handbook, McGraw-Hill, 2000.

ME8099	ROBOTICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the functions of the basic components of a Robot.
To study the use of various types of End of Effectors and Sensors
To impart knowledge in Robot Kinematics and Programming
To learn Robot safety issues and economics.

UNIT I FUNDAMENTALS OF ROBOT 9

Robot - Definition - Robot Anatomy - Co ordinate Systems, Work Envelope Types and Classification- Specifications-Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load- Robot Parts and their Functions-Need for Robots-Different Applications.

UNIT II ROBOT DRIVE SYSTEMS AND END EFFECTORS 9

Pneumatic Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives-D.C. Servo Motors, Stepper Motors, A.C. Servo Motors-Salient Features, Applications and Comparison of all these Drives, End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic- Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT III SENSORS AND MACHINE VISION 9

Requirements of a sensor, Principles and Applications of the following types of sensors- Position sensors - Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, pneumatic Position Sensors, Range Sensors Triangulations Principles, Structured, Lighting Approach, Time of Flight, Range Finders, Laser Range Meters, Touch Sensors ,binary Sensors., Analog Sensors, Wrist Sensors, Compliance Sensors, Slip Sensors, Camera, Frame Grabber, Sensing and Digitizing Image Data-Signal Conversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms, Applications-Inspection, Identification, Visual Serving and Navigation.

UNIT IV ROBOT KINEMATICS AND ROBOT PROGRAMMING 9

Forward Kinematics, Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Four Degrees of freedom (in 3 Dimension) Jacobians, Velocity and Forces-Manipulator Dynamics, Trajectory Generator, Manipulator Mechanism Design-Derivations and problems. Lead through Programming, Robot programming Languages-VAL Programming-Motion Commands, Sensor Commands, End Effector commands and simple Programs.

UNIT V IMPLEMENTATION AND ROBOT ECONOMICS 9

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the concepts of industrial robots, classification, specifications and coordinate systems. Also summarize the need and application of robots in different sectors.

CO2 Illustrate the different types of robot drive systems as well as robot end effectors.

CO3 Apply the different sensors and image processing techniques in robotics to improve the ability of robots.

CO4 Develop robotic programs for different tasks and familiarize with the kinematics motions of robot.

CO5 Examine the implementation of robots in various industrial sectors and interpolate the economic analysis of robots.

TEXT BOOKS:

Groover M.P., “Industrial Robotics -Technology Programming and Applications”, McGraw Hill, 2012.

Klafter R.D., Chmielewski T.A and Negin M., “Robotic Engineering - An Integrated Approach”,Prentice Hall, 2003.

REFERENCES:

Craig J.J., “Introduction to Robotics Mechanics and Control”, Pearson Education, 2008.

Deb S.R., “Robotics Technology and Flexible Automation” Tata McGraw Hill Book Co., 2013.

Fu.K.S.,Gonzalz R.C. and Lee C.S.G., “Robotics Control, Sensing, Vision and Intelligence”, McGraw Hill Book Co., 1987.

Janakiraman P.A., “Robotics and Image Processing”, Tata McGraw Hill, 1995.

Koren Y., “Robotics for Engineers", Mc Graw Hill Book Co., 1992.

ME8092	COMPOSITE MATERIALS AND MECHANICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To understand the fundamentals of composite material strength and its mechanical behavior

Understanding the analysis of fiber reinforced Laminate design for different combinations of plies with different orientations of the fiber.

Thermo-mechanical behavior and study of residual stresses in Laminates during processing.

Implementation of Classical Laminate Theory (CLT) to study and analysis for residual stresses in an isotropic layered structure such as electronic chips.

UNIT I INTRODUCTION, LAMINA CONSTITUTIVE EQUATIONS & MANUFACTURING 9

Definition –Need – General Characteristics, Applications. Fibers – Glass, Carbon, Ceramic and Aramid fibers. Matrices – Polymer, Graphite, Ceramic and Metal Matrices – Characteristics of fibers and matrices. Lamina Constitutive Equations: Lamina Assumptions – Macroscopic Viewpoint. Generalized Hooke,s Law. Reduction to Homogeneous Orthotropic Lamina – Isotropic limit case, Orthotropic Stiffness matrix (Qij), Typical Commercial material properties, Rule of Mixtures. Generally Orthotropic Lamina –Transformation Matrix, Transformed Stiffness. Manufacturing: Bag Moulding Compression Moulding – Pultrusion – Filament Winding – Other Manufacturing Processes

UNIT II FLAT PLATE LAMINATE CONSTITUTE EQUATIONS 9

Definition of stress and Moment Resultants. Strain Displacement relations. Basic Assumptions of Laminated anisotropic plates. Laminate Constitutive Equations – Coupling Interactions, Balanced Laminates, Symmetric Laminates, Angle Ply Laminates, Cross Ply Laminates. Laminate Structural Moduli. Evaluation of Lamina Properties from Laminate Tests. Quasi-Isotropic Laminates. Determination of Lamina stresses within Laminates.

UNIT III LAMINA STRENGTH ANALYSIS 9

Introduction - Maximum Stress and Strain Criteria. Von-Misses Yield criterion for Isotropic Materials. Generalized Hill,s Criterion for Anisotropic materials. Tsai-Hill,s Failure Criterion for Composites. Tensor Polynomial (Tsai-Wu) Failure criterion. Prediction of laminate Failure

UNIT IV THERMAL ANALYSIS 9

Assumption of Constant C.T.E,s. Modification of Hooke,s Law. Modification of Laminate Constitutive Equations. Orthotropic Lamina C.T.E,s. C.T.E,s for special Laminate Configurations – Unidirectional, Off-axis, Symmetric Balanced Laminates, Zero C.T.E laminates, Thermally Quasi-Isotropic Laminates

UNIT V ANALYSIS OF LAMINATED FLAT PLATES 9

Equilibrium Equations of Motion. Energy Formulations. Static Bending Analysis. Buckling Analysis. Free Vibrations – Natural Frequencies

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Summarize the various types of Fibers, Equations and manufacturing methods for Composite materials

CO2 Derive Flat plate Laminate equations

CO3 Analyze Lamina strength

CO4 Analyze the thermal behavior of Composite laminates

CO5 Analyze Laminate flat plates

TEXT BOOKS:

Gibson, R.F., "Principles of Composite Material Mechanics", Second Edition, McGraw-Hill, CRC press in progress, 1994, -.

Hyer, M.W., “Stress Analysis of Fiber – Reinforced Composite Materials”, McGraw Hill, 1998

REFERENCES:

Agarwal, B.D., and Broutman L.J., “Analysis and Performance of Fiber Composites”, John Wiley and Sons, New York, 1990.

Halpin, J.C., “Primer on Composite Materials, Analysis”, Technomic Publishing Co., 1984.

Issac M. Daniel and Ori Ishai, “Engineering Mechanics of Composite Materials”, Oxford University Press-2006, First Indian Edition - 2007

Mallick, P.K., Fiber, ”Reinforced Composites: Materials, Manufacturing and Design”, Maneel Dekker Inc, 1993.

Mallick, P.K. and Newman, S., (edition), “Composite Materials Technology: Processes and Properties”, Hansen Publisher, Munish, 1990.

GE8072	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT	L T P C 3 0 0 3

OBJECTIVES:

To understand the global trends and development methodologies of various types of products and services

To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems

To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification

To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics

To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends - Environmental Trends - Political/Policy Trends **- Introduction to Product Development Methodologies and Management -** Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies Product Life Cycle – Product Development Planning and Management.

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9

Requirement Engineering - Types of Requirements - Requirement Engineering - traceability Matrix and Analysis - Requirement Management - **System Design & Modeling -** Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design.

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – **Challenges in Integration of Engineering Disciplines** - Concept Screening & Evaluation - **Detailed Design -** Component Design and Verification – **Mechanical, Electronics and Software Subsystems** - High Level Design/Low Level Design of S/W Program **-** Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – **Prototyping -** Introduction to Rapid Prototyping and Rapid Manufacturing - **System Integration, Testing, Certification and Documentation**

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product Validation processes and stages - Product Testing Standards and Certification - Product Documentation **Sustenance -**Maintenance and Repair – Enhancements - **Product EoL -** Obsolescence Management – Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product Development in Industry versus Academia –**The IPD Essentials -** Introduction to Vertical Specific Product Development processes -Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and Software Systems – Product Development Trade-offs - Intellectual Property Rights and Confidentiality – Security and Configuration Management.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

Define, formulate and analyze a problem
Solve specific problems independently or as part of a team
Gain knowledge of the Innovation & Product Development process in the Business Context
Work independently as well as in teams
Manage a project from start to finish

TEXTBOOKS:

Book specially prepared by NASSCOM as per the MoU.
Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, Fifth Edition, 2011.
John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill, Eleventh Edition, 2005.

REFERENCES:

Hiriyappa B, “Corporate Strategy – Managing the Business”, Author House, 2013.
Peter F Drucker, “People and Performance”, Butterworth – Heinemann [Elsevier], Oxford, 2004.
Vinod Kumar Garg and Venkita Krishnan N K, “Enterprise Resource Planning – Concepts”, Second Edition, Prentice Hall, 2003.
Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, Seventh Edition, 2013

GE8074 **HUMAN RIGHTS** **L T P C**
3 0 0 3

OBJECTIVE:

To sensitize the Engineering students to various aspects of Human Rights.

UNIT I **9**

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II **9**

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III **9**

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV **9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO,s, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

OUTCOME :

Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

Chandra U., “Human Rights”, Allahabad Law Agency, Allahabad, 2014.

Kapoor S.K., “Human Rights under International law and Indian Laws”, Central Law Agency, Allahabad, 2014.

Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

AT8008 **TRANSPORT MANAGEMENT** **L T P C**
3 0 0 3

OBJECTIVE:

The students are able to manage a transport fleet and their related activities for minimizing operational cost.

UNIT I INTRODUCTION **9**

Personnel management; objectives and functions of personnel management, psychology, sociology and their relevance to organization, personality problems. Selection process: job description, employment tests, interviewing, introduction to training objectives, advantages, methods of training, training procedure, psychological tests.

UNIT II TRANSPORT SYSTEMS 9

Introduction to various transport systems. Advantages of motor transport. Principal function of administrative, traffic, secretarial and engineering divisions. chain of responsibility, forms of ownership by state, municipality, public body and private undertakings.

UNIT III SCHEDULING AND FARE STRUCTURE 9

Principal features of operating costs for transport vehicles with examples of estimating the costs. Fare structure and method of drawing up of a fare table. Various types of fare collecting methods. Basic factors of bus scheduling. Problems on bus scheduling.

UNIT IV MOTOR VEHICLE ACT 9

Traffic signs, fitness certificate, registration requirements, permit insurance, constructional regulations, description of vehicle-tankers, tippers, delivery vans, recovery vans, Power wagons and fire fighting vehicles. Spread over, running time, test for competence to drive.

UNIT V MAINTENANCE 9

Preventive maintenance system in transport industry, tyre maintenance procedures. Causes for uneven tyre wear; remedies, maintenance procedure for better fuel economy, Design of bus depot layout.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will

Know about different aspects related to transport system and management.
Features of scheduling, fixing the fares
Know about the motor vehicle act and maintenance aspects of transport.

TEXT BOOKS:

John Duke, "Fleet Management", McGraw-Hill Co, USA, 1984.
Kitchin.L.D., "Bus Operation", III edition, Illiffee and Sons Co., London, 1992

REFERENCE:

1. Government Motor Vehicle Act, Publication on latest act to be used as on date

MG8091	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVE:

To develop and strengthen entrepreneurial quality and motivation in students and to impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.

UNIT I ENTREPRENEURSHIP 9

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.

UNIT II MOTIVATION **9**

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.

UNIT III BUSINESS **9**

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

UNIT IV FINANCING AND ACCOUNTING **9**

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.

UNIT V SUPPORT TO ENTREPRENEURS **9**

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures - Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

TOTAL : 45 PERIODS

OUTCOME:

Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully.

TEXT BOOKS :

Donald F Kuratko, “Entreprenuership – Theory, Process and Practice”, 9th Edition, Cengage Learning, 2014.

Khanka. S.S., “Entrepreneurial Development” S.Chand & Co. Ltd., Ram Nagar, New Delhi, 2013.

REFERENCES :

EDII “Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development”, Institute of India, Ahmadabad, 1986.

Hisrich R D, Peters M P, “Entrepreneurship” 8th Edition, Tata McGraw-Hill, 2013.

Mathew J Manimala, "Enterprenuership theory at cross roads: paradigms and praxis” 2nd Edition Dream tech, 2005.

Rajeev Roy, "Entrepreneurship" 2nd Edition, Oxford University Press, 2011.

AT8009 AUTOMOTIVE SAFETY **L T P C**
3 0 0 3

OBJECTIVE:

At the end, the students will have good exposure to automotive safety aspects including the understanding of the various safety equipments.

UNIT I INTRODUCTION **9**

Design of the body for safety, energy equation, engine location, deceleration of vehicle inside passenger compartment, deceleration on impact with stationary and movable obstacle, concept of crumble zone, safety sandwich construction.

UNIT II SAFETY CONCEPTS **9**

Active safety: driving safety, conditional safety, perceptibility safety, operating safety, passive safety: exterior safety, interior safety, deformation behaviour of vehicle body, speed and acceleration characteristics of passenger compartment on impact.

UNIT III SAFETY EQUIPMENTS **9**

Seat belt, regulations, automatic seat belt tightener system, collapsible steering column, tiltable steering wheel, air bags, electronic system for activating air bags, bumper design for safety.

UNIT IV COLLISION WARNING AND AVOIDANCE **9**

Collision warning system, causes of rear end collision, frontal object detection, rear vehicle object detection system, object detection system with braking system interactions.

UNIT V COMFORT AND CONVENIENCE SYSTEM **9**

Steering and mirror adjustment, central locking system , Garage door opening system, tyre pressure control system, rain sensor system, environment information system

TOTAL: 45 PERIODS

OUTCOME:

The student will be familiar in various systems that enhances vehicle safety, passenger comfort, recent technologies in automobile field etc.,

TEXT BOOKS

Bosch, “Automotive Handbook”, 8th Edition, SAE publication, 2011.
Powloski. J., “Vehicle Body Engineering”, Business books limited, London, 1969.

REFERENCES:

1. Ronald.K.Jurgen, “Automotive Electronics Handbook”, Second Edition, McGraw-Hill Inc., 1999.

AT8010 AUTOMOTIVE POLLUTION AND CONTROL **L T P C**
3 0 0 3

OBJECTIVE:

The main objective of this course is to impart knowledge in automotive pollution control. The detailed concept of formation and control techniques of pollutants like UBHC, CO, NO_x, particulate matter and smoke for both SI and CI engine will be taught to the students. The instruments for measurement of pollutants and emission standards will also be introduced to the students. At the end of the course the students will have command over automotive pollution and control.

UNIT I INTRODUCTION **6**

Pollutants – sources – formation – effects of pollution on environment - human – transient operational effects on pollution – Regulated – Unregulated emissions - Emission Standards - Introduction to BS-VI

UNIT II EMISSIONS IN SI ENGINE 11

Chemistry of SI engine combustion – HC and CO formation in SI engines – NO formation in SI engines – Smoke emissions from SI engines – Effect of operating variables on emission formation.

UNIT III EMISSIONS IN CI ENGINE 10

Basics of diesel combustion – Smoke emission and its types in diesel engines – NOx emission and its types from diesel engines – Particulate emission in diesel engines. Odor, sulfur and Aldehyde emissions from diesel engines – effect of operating variables on emission formation.

UNIT IV CONTROL TECHNIQUES FOR REDUCTION OF EMISSION 9

Design modifications – Optimization of operating factors – Fuel modification – Evaporative emission control - Exhaust gas recirculation – DOC -SCR – Fumigation – Secondary Air injection – PCV system – Particulate Trap – CCS – Exhaust treatment in SI engines –Thermal reactors – Catalytic converters – Catalysts – Use of unleaded petrol.

UNIT V TEST PROCEDURE, INSTRUMENTATION & EMISSION MEASUREMENT 9

Test procedures CVS1, CVS3 – Test cycles – IDC – ECE Test cycle – FTP Test cycle - NDIR analyzer – Flame ionization detectors – Chemiluminescent analyzer – Dilution tunnel - Gas chromatograph – Smoke meters –SHED test.

TOTAL : 45 PERIODS

OUTCOME:

Upon the completion of the course, the student will understand the fundamentals of formation of automobile pollutions in SI and CI Engines, various control techniques, test procedures etc.

TEXT BOOKS:

Pundir. B.P., " IC Engines Combustion and Emissions" Narosa Publishers, 2010
Springer and Patterson, "Engine Emission", Plenum Press, 1990.

REFERENCES:

Automobiles and Pollution SAE Transaction, 1995
Ganesan,V., "Internal Combustion Engines", Tata McGraw Hill Co., 1994.
Heywood,J.B., "Internal Combustion Engine Fundamentals", McGraw Hill Book Co., 1995.
Obert,E.F., "Internal Combustion Engines", 1982.
Ramalingam. K.K., "Internal Combustion Engines", Scitech Publications, 2003.
SAE Transactions, "Vehicle Emission", 3 volumes, 1982.
Taylor,C.F., "Internal Combustion Engines", MIT Press, 1972.

AT8011 AUTOMOTIVE TESTING L T P C
3 0 0 3

OBJECTIVES:

To introduce the learners with the need for automotive testing methods and their importance.
To equip them with knowledge in various testing standards and guidelines.

UNIT I VEHICLE WIND TUNNEL TESTING AND BODY TESTING 10

Wind tunnel test requirements - Ground boundary simulation - wind tunnel selection and Reynolds number capability, model details, mounting of model, Test procedure.

Body test - Dynamics simulation sled testing - Dolly roll over test - Dolly roll over fixture - vehicle roof strength test - Door system crash test.

UNIT II COLLISION AND CRASH TESTING 9

Crash testing: Human Testing, Dummies, Crash worthiness, pole crash testing, near crash testing, vehicle to vehicle impact, side impact testing, crash test sensor, sensor mounting positions, crash test data acquisition, braking distance test.

UNIT III TESTING OF WHEELS AND BRAKES 10

Wheels: Dynamic cornering fatigue, dynamic radial fatigue tests-procedures, bending moment and radial load calculations. Impact test -Road hazard impact test for wheel and tyre assemblies test procedures, Failure criteria and performance criteria.

UNIT IV ENERGY AND FUEL CONSUMPTION TESTING 7

Engine cooling fan, air conditioning and brake compressors, hydraulic pumps power consumptions, ABS energy consumption.

Test Route selection, vehicle test speeds, cargo, weights, driver selection, Tested data, finding and calculations. Test on rough terrain, Pot hole with laden and unladden conditions.

UNIT V VEHICLE COMPONENT RELATED TESTING 9

Reading - longer texts - close reading, writing - brainstorming - writing short essays - developing an outline - identifying main and subordinate ideas - dialogue writing. Listening - listening to talks - conversations. Speaking - participating in conversations - short group conversations. Language development -modal verbs-present/post perfect tense. Vocabulary development - collocations.

TOTAL : 45 PERIODS

OUTCOMES:

At the end of the course, learners will be able to:

Prepare the vehicle for testing according to standards
Test the vehicle in static and dynamic conditions.
Incorporate all the automotive testing regulations while testing a vehicle
Test on effectiveness and efficiency of all the components
Analyse the vehicle and report the results.

REFERENCES:

Beck with. T.G. and Buck. N.L."Mechanical Measurements", Addition Wesley publishing company Limited, 1995.
SAE Hand book, Vol 3, SAE, Publications, 2000
Tim Grilles, "Automotive Service" Delmar publishers, 1998
W.H. course& D.L. Anglin, "Automotive Mechanics" TMG publishing company, 2004
Automotive Handbook, Bosch.
Website: www.mainindia.com/Draft, AIS standards. asp.

PR8491 COMPUTER INTEGRATED MANUFACTURING L T P C
3 0 0 3

OBJECTIVE:

To understand the application of computers in various aspects of Manufacturing viz., Design, Proper planning, Manufacturing cost, Layout & Material Handling system.

UNIT I INTRODUCTION 9

Brief introduction to CAD and CAM – Manufacturing Planning, Manufacturing control- Introduction to CAD/CAM – Concurrent Engineering-CIM concepts – Computerised elements of CIM system – Types of production - Manufacturing models and Metrics – Mathematical models of Production Performance – Simple problems – Manufacturing Control – Simple Problems – Basic Elements of an Automated system – Levels of Automation – Lean Production and Just-In-Time Production.

UNIT II PRODUCTION PLANNING AND CONTROL AND COMPUTER AIDED PROCESS PLANNING 9

Process planning – Computer Aided Process Planning (CAPP) – Logical steps in Computer Aided Process Planning – Aggregate Production Planning and the Master Production Schedule – Material Requirement planning – Capacity Planning- Control Systems-Shop Floor Control-Inventory Control – Brief on Manufacturing Resource Planning-II (MRP-II) & Enterprise Resource Planning (ERP) - Simple Problems.

UNIT III CELLULAR MANUFACTURING 9

Group Technology(GT), Part Families – Parts Classification and coding – Simple Problems in Opitz Part Coding system – Production flow Analysis – Cellular Manufacturing – Composite part concept – Machine cell design and layout – Quantitative analysis in Cellular Manufacturing – Rank Order Clustering Method - Arranging Machines in a GT cell – Hollier Method – Simple Problems.

UNIT IV FLEXIBLE MANUFACTURING SYSTEM (FMS) AND AUTOMATED GUIDED VEHICLE SYSTEM (AGVS) 9

Types of Flexibility - FMS – FMS Components – FMS Application & Benefits – FMS Planning and Control– Quantitative analysis in FMS – Simple Problems. Automated Guided Vehicle System (AGVS) – AGVS Application – Vehicle Guidance technology – Vehicle Management & Safety.

UNIT V INDUSTRIAL ROBOTICS 9

Robot Anatomy and Related Attributes – Classification of Robots- Robot Control systems – End Effectors – Sensors in Robotics – Robot Accuracy and Repeatability - Industrial Robot Applications – Robot Part Programming – Robot Accuracy and Repeatability – Simple Problems.

TOTAL : 45 PERIODS

OUTCOMES:

Student will be able to

- Describe about the classical production system, the components of CIM .
- Explain the concept of Computer Aided Process Planning (CAPP) and Material Requirements Planning (MRP)
- Illustrate the cellular manufacturing using Rank order, Clustering and Hollier method
- Explain Flexible Manufacturing system and applications of Automated Guided Vehicles in the implementation of CIM..
- Describe the configurations of Industrial Robots, and their part programming.
- Understand the use of computers in various Manufacturing support systems.

TEXT BOOKS:

Mikell.P.Groover “Automation, Production Systems and Computer Integrated Manufacturing”, Prentice Hall of India, 2008.

Radhakrishnan P, Subramanyan S.and Raju V., “CAD/CAM/CIM”, 2nd Edition, New Age International (P) Ltd, New Delhi, 2004.

REFERENCES:

Gideon Halevi and Roland Weill, “Principles of Process Planning – A Logical Approach” Chapman & Hall, London, 1995.

Kant Vajpayee S, “Principles of Computer Integrated Manufacturing”, Prentice Hall India, 2003.

Rao. P, N Tewari &T.K. Kundra, “Computer Aided Manufacturing”, Tata McGraw Hill Publishing Company, 2000.

AT8012 ALTERNATIVE FUELS AND ENERGY SYSTEMS LTPC
3 0 0 3

OBJECTIVE:

To know about the types of alternative fuels and energy sources for IC engines.

UNIT I ALCOHOLS AS FUELS 9

Introduction to alternative fuels. - Need for alternative fuels - Availability of different alternative fuels for SI and CI engines. Alcohols as fuels. Production methods of alcohols. Properties of alcohols as fuels. Methods of using alcohols in CI and SI engines. Blending, dual fuel operation, surface ignition and oxygenated additives. Performance emission and combustion characteristics in CI and SI engines.

UNIT II VEGETABLE OILS AS FUELS 9

Various vegetable oils and their important properties. Different methods of using vegetable oils engines – Blending, preheating Transesterification and emulsification of Vegetable oils - Performance in engines – Performance, Emission and Combustion Characteristics in diesel engines.

UNIT III HYDROGEN AS ENGINE FUEL 9

Production methods of hydrogen. Combustive properties of hydrogen. Problems associated with hydrogen as fuel and solutions. Different methods of using hydrogen in SI and CI engines. Performance, emission and combustion analysis in engines. Hydrogen storage - safety aspects of hydrogen.

UNIT IV BIOGAS, NATURAL GAS AND LPG AS FUELS 9

Production methods of Biogas, Natural gas and LPG. Properties studies. CO_2 and H_2S scrubbing in Biogas., Modification required to use in SI and CI Engines- Performance and emission characteristics of Biogas, NG and LPG in SI and CI engines.

UNIT V ELECTRIC, HYBRID AND FUEL CELL VEHICLES 9

Layout of Electric vehicle and Hybrid vehicles – Advantages and drawbacks of electric and hybrid vehicles. System components, Electronic control system – Different configurations of Hybrid vehicles. Power split device. High energy and power density batteries – Basics of Fuel cell vehicles.

TOTAL : 45 PERIODS

OUTCOME:

On completion of the course, the student will understand the various alternative fuels available, its properties, performance characteristics, combustion characteristics, emission characteristics, engine modifications required etc.,

TEXT BOOK:

Ayhan Demirbas, ˆBiodiesel A Realistic Fuel Alternative for Diesel Engines,, Springer-Verlag London Limited 2008,ISBN-13: 9781846289941

REFERENCES:

Devaradjane. Dr. G., Kumaresan. Dr. M., "Automobile Engineering", AMK Publishers, 2013.

Gerhard Knothe, Jon Van Gerpen, Jargon Krahl, The Biodiesel Handbook, AOCS Press Champaign, Illinois 2005.

Richard L Bechtold P.E., Alternative Fuels Guide book, Society of Automotive Engineers, 1997 ISBN 0-76-80-0052-1.

Science direct Journals (Biomass & Bio energy, Fuels, Energy, Energy conversion Management, Hydrogen Energy, etc.) on biofuels.

Transactions of SAE on Biofuels (Alcohols, vegetable oils, CNG, LPG, Hydrogen, Biogas etc.).

MG8591 PRINCIPLES OF MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:

To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization .

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING 9

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V CONTROLLING **9**

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOME :

Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXT BOOKS:

JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004.

Stephen P. Robbins & Mary Coulter, "Management", 10th Edition, Prentice Hall (India)Pvt. Ltd., 2009.

REFERENCES:

Harold Koontz & Heinz Weihrich "Essentials of management" Tata McGraw Hill, 1998.

Robert Kreitner & Mamata Mohapatra, "Management", Biztantra, 2008.

Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management", 7th Edition, Pearson Education, 2011.

Tripathy PC & Reddy PN, "Principles of Management", Tata Mcgraw Hill, 1999

GE8076 PROFESSIONAL ETHICS IN ENGINEERING **LTPC 3003**

OBJECTIVE:

To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES **10**

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS **9**

Senses of ˆEngineering Ethics, – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg,s theory – Gilligan,s theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION **9**

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES 8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

TOTAL: 45 PERIODS

OUTCOME:

Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXT BOOKS:

Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.

REFERENCES:

Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.

Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009.

Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003

Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.

World Community Service Centre, ˆValue Education,, Vethathiri publications, Erode, 2011.

Web sources:

www.onlineethics.org

www.nspe.org

www.globalethics.org

www.ethics.org

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: AUTOMOTIVE EMBEDDED AND CONTROL SYSTEM LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial / Invoice No
1	Deisgn and simulation Prototype power window & Sunroof control using DC Motor 1) Working model of sun roof setup	1	68,500	19-09-11	EQ/173/11-12 19
2	MPS 85-3-8085 based microprocessor trainer LED display with power supply +5V @ 3A +/- 12V 250mA, +30V @ 100mA	10	73,500	12-10-12	

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: AUTOMOTIVE FUELS & LUBRICANTS LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial / Invoice No
1	Bomb Calorimeter	1	58760	20/08/2007	093
2	Single Distillation apparatus	1	63441	20/08/2007	093
3	Exhaust gas analyzer (Petrol Engine)	1	220877	23/04/2010	0020/10-11
4	Diesel smoke meter	1	150800	15/09/2010	179
5	Fuel Analysis Test apparatus	1	86500	06-06-13	EQ/052/13-14
6	Boys Gas Calorimeter	1	65000	06-06-13	EQ/052/13-14
7	Ramsbottom Carbon Residue Apparatus	1	71500	06-06-13	EQ/052/13-14
8	Copper Strip Corrosion apparatus	1	62500	06-06-13	EQ/052/13-14
9	Work table(SS304)	8	115500	19/8/2014	009

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: COMPUTER AIDED DESIGN LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial/Invoice No
1	Computer System	34	1010650	15.06.2010	(Span Office)
2	CATIA V5 R21	10 users	199512	17.08.2012	P1/1213/010
3	ANSYS Academic Teaching	50 users	525000	06.09.2012	030-2012-13
4	HP 3330 Series PC	12	346500	10.12.2012	J9P6054897

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: INTERNAL COMBUSTION ENGINES LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial/Invoice No
1	LENOVA Desktop PC	2	80500	11-09-13	4069/13-14
2	Exhaust gas Analyzer AVL make	1	337838	27/11/2013	20/2013-14
3	Multicylinder petrol engine PSP 2304	1	714065	30/12/2013	26/2013-14
4	Multicylinder diesel engine test rig	1	1370545	25/02/2014	31/2013-14

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: VEHICLE MAINTENANCE LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial / Invoice No
1	"FERRET" UEA Engine Analyzer	1	55000	28.07.2009	5865
2	Air compressor	1	66709.76	13.10.2009	0170/09-12
3	Tyre Changer	1	90000	13.10.2009	01699/09-10
4	Wheel Aligner	1	469998	24/02/2009	613/68002987
5	Wheel Balancer	1	110000	13/10/2009	0169/09-10
6	Cylinder Reboring machine	1	115000	12-10-09	12683

Tamilnadu College of Engineering

Department of Automobile Engineering

Equipment Details

Name of the Lab: 2 & 3 WHEELERS LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial/Invoice No
	Computerized Shock absorber test rig	1	249600	10-11-07	0283
	Computerized two wheeler chassis dynamometer	1	364000	10-11-07	0283
	Eddy current dynamometer	1	142272	10-11-07	0283
	Two wheeler chain tension test rig	1	135000	06-04-13	EQ/051/13-14
	Study of 3 wheeler chassis frame and power transmission system	1	76000	27/06/2013	EQ/072/13-14

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: AUTOMOTIVE COMPONENTS LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial / Invoice No
1	Master cylinder re-boring machine	1	115000	10-12-09	12683
2	MPFI engine working condition	1	55000	08-08-12	1255

Tamilnadu College of Engineering
Department of Automobile Engineering
Equipment Details

Name of the Lab: AUTOMOTIVE ELECTRICALS AND ELECTRONICS LAB

S.No	Name of the Equipment	Quantity	Cost in Rs	Date of Purchase	Serial / Invoice No
1	Auto Electrical Test Bench	1	72000	02.08.2008	624
2	Ignition system Fault Diagnosis	1	56000	08.09.208	624

DEPARTMENT OF EEE LAB EXPERIMENTS

GE3171PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C

0 0 4 2

OBJECTIVES:

- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To practice various computing strategies for Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

EXPERIMENTS:

Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in alibrary/Components of a car/ Materials required for construction of a building – operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (divide by zero error,

voter's age validity, student mark range validation)

11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc.

TOTAL: 60 PERIODS

OUTCOMES:

On completion of the course, students will be able to:

CO1: Develop algorithmic solutions to simple computational problems

CO2: Develop and execute simple Python programs.

CO3: Implement programs in Python using conditionals and loops for solving problems.. CO4: Deploy functions to decompose a Python program.

CO5: Process compound data using Python data structures.

CO6: Utilize Python packages in developing software applications.

TEXT BOOKS:

1. Allen B. Downey, "Think Python : How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press , 2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

BS3171 PHYSICS AND CHEMISTRY LABORATORY **L T P C**
0 0 4 2

PHYSICS LABORATORY : (Any Seven Experiments)

OBJECTIVES:

- To learn the proper use of various kinds of physics laboratory equipment.

- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student as an active participant in each part of all lab exercises.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wave length of the laser using grating
6. Air wedge - Determination of thickness of a thin sheet/wire
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamics kit.

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of the course, the students should be able to

- Understand the functioning of various physics laboratory equipment.
- Use graphical models to analyze laboratory data.
- Use mathematical models as a medium for quantitative reasoning and describing physical reality.
- Access, process and analyze scientific information.
- Solve problems individually and collaboratively

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in water sample.
   - Split the first experiment into two
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.
12. Estimation of sodium /potassium present in water using flame photometer.
13. Preparation of nanoparticles (TiO_2/ZnO/CuO) by Sol-Gel method.
14. Estimation of Nickel in steel
15. Proximate analysis of Coal

TOTAL : 30 PERIODS

OUTCOMES :

- To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
- To determine the amount of metal ions through volumetric and spectroscopic techniques
- To analyse and determine the composition of alloys.
- To learn simple method of synthesis of nanoparticles
- To quantitatively analyse the impurities in solution by electroanalytical techniques

TEXT BOOKS :

1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's

Textbook of

Quantitative Chemical Analysis (2009).

GE3271 ENGINEERING PRACTICES LABORATORY L T P C
0 0 4 2

OBJECTIVES:

The main learning objective of this course is to provide hands on training to the students in:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in common household wood work.
2. Wiring various electrical joints in common household electrical wire work.
3. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
4. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES 15

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
b) Preparing plumbing line sketches.
c) Laying pipe connection to the suction side of a pump d) Laying pipe connection to the delivery side of a pump.
e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

a) Sawing,
b) Planing and
c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:

a) Studying joints in door panels and wooden furniture
b) Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES 15

a) Introduction to switches, fuses, indicators and lamps - Basic switch board

wiring with lamp, fan and three pin socket

b) Staircase wiring

c) Fluorescent Lamp wiring with introduction to CFL and LED types. d) Energy meter wiring and related calculations/ calibration

e) Study of Iron Box wiring and assembly

f) Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)

g) Study of emergency lamp wiring/Water heater

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding. b) Practicing gas welding.

BASIC MACHINING WORK:

a) (simple)Turning.

b) simple)Drilling.

C (simple)Tapping.

ASSEMBLY WORK:

a) Assembling a centrifugal pump. b) Assembling a household mixer. c) Assembling an airconditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES 15

SOLDERING WORK:

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

a) Study an elements of smart phone.

b) Assembly and dismantle of LED TV.

c) Assembly and dismantle of computer/ laptop

TOTAL : 60 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to:

1. Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
2. Wire various electrical joints in common household electrical wire work.
3. Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
4. Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

EE3271	**ELECTRIC CIRCUITS LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

OBJECTIVES:

- To simulate various electric circuits using Pspice/ Matlab/e-Sim / Scilab
- To gain practical experience on electric circuits and verification of theorems

LIST OF EXPERIMENTS

Familiarization of various electrical components, sources and measuring instruments

1. Simulation and experimental verification of series and parallel electrical circuit using fundamental laws.
2. Simulation and experimental verification of electrical circuit problems using Thevenin's theorem
3. Simulation and experimental verification of electrical circuit problems using Norton's theorem.
4. Simulation and experimental verification of electrical circuit problems using Superposition theorem.
5. Simulation and experimental verification of Maximum Power transfer theorem.
6. Simulation and Experimental validation of R-C,R-L and RLC electric circuit transients
7. Simulation and Experimental validation of frequency response of RLC electric circuit.
8. Design and implementation of series and parallel resonance circuit.
9. Simulation and experimental verification of three phase balanced and unbalanced star, delta networks circuit (Power and Power factor calculations).

TOTAL: 60 PERIODS

OUTCOMES:

- Use simulation and experimental methods to verify the fundamental electrical laws for the given DC/AC circuit (Ex 1)
- Use simulation and experimental methods to verify the various electrical theorems (Superposition, Thevenin , Norton and maximum power transfer) for the given DC/AC circuit (Ex 2-5)
- Analyze transient behavior of the given RL/RC/RLC circuit using simulation and experimental methods (Ex 6)
- Analyze frequency response of the given series and parallel RLC circuit using simulation and experimentation methods (Ex 7-8)
- Analyze the performance of the given three-phase circuit using simulation and experimental methods (Ex 9)

EE8261 ELECTRIC CIRCUITS LABORATORY

LIST OF EXPERIMENTS

Simulation and experimental verification of electrical circuit problems using Kirchhoff's voltage and current laws.

Simulation and experimental verification of electrical circuit problems using **Thevenin's** theorem.

Simulation and experimental verification of electrical circuit problems using **Norton's** theorem.

Simulation and experimental verification of electrical circuit problems using Superposition theorem.

Simulation and experimental verification of Maximum Power transfer Theorem.

Study of Analog and digital oscilloscopes and measurement of sinusoidal voltage, frequency and power factor.

Simulation and Experimental validation of R-C electric circuit transients.

Simulation and Experimental validation of frequency response of RLC electric circuit.

Design and Simulation of series resonance circuit.

Design and Simulation of parallel resonant circuits.

Simulation of three phase balanced and unbalanced star, delta networks circuits

EC8311-ELECTRONICS LABORATORY

LIST OF EXPERIMENTS

Characteristics of Semiconductor diode and Zener diode

2. Characteristics of a NPN Transistor under common emitter , common collector and common base configurations

Characteristics of JFET and draw the equivalent circuit

Characteristics of UJT and generation of saw tooth waveforms

Design and Frequency response characteristics of a Common Emitter amplifier

Characteristics of photo diode & photo transistor, Study of light activated relay circuit

Design and testing of RC phase shift and LC oscillators

Single Phase half-wave and full wave rectifiers with inductive and capacitive filters

Differential amplifiers using FET

Study of CRO for frequency and phase measurements

EE8311-ELECTRICAL MACHINES LABORATORY-I

LIST OF EXPERIMENTS

Open circuit and load characteristics of DC shunt generator- critical resistance and critical speed.

Load characteristics of DC compound generator with differential and cumulativeconnections.

Load test on DC shunt motor.

Load test on DC compound motor.

Load test on DC series motor.

Swinburne's test and speed control of DC shunt motor.

Hopkinson's test on DC motor – generator set.

Load test on single-phase transformer and three phase transformers.

Open circuit and short circuit tests on single phase transformer.

Sumpner's test on single phase transformers.

Separation of no-load losses in single phase transformer.

12Study of starters and 3-phase transformers connections**.**

EE8411 ELECTRICAL MACHINES LABORATORY II-

LIST OF EXPERIMENTS

Regulation of three phase alternator by EMF and MMF methods.

Regulation of three phase alternator by ZPF and ASA methods.

Regulation of three phase salient pole alternator by slip test.

Measurements of negative sequence and zero sequence impedance of alternators.

V and Inverted V curves of Three Phase Synchronous Motor.

Load test on three-phase induction motor.

No load and blocked rotor tests on three-phase induction motor (Determination of equivalent circuit parameters).

Separation of No-load losses of three-phase induction motor.

Load test on single-phase induction motor.

No load and blocked rotor test on single-phase induction motor.

Study of Induction motor Starters

EE8461 LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY

LIST OF EXPERIMENTS

Implementation of Boolean Functions, Adder and Subtractor circuits.

Code converters: Excess-3 to BCD and Binary to Gray code converter and vice-versa

Parity generator and parity checking

Encoders and Decoders

Counters: Design and implementation of 3-bit modulo counters as synchronous and Asynchronous types using **FF IC's** and specific counter IC.

Shift Registers: Design and implementation of 4-bit shift registers in SISO, SIPO, PISO,PIPO modes using suitability **IC's.**

Study of multiplexer and de multiplexer

Timer IC application: Study of NE/SE 555 timer in Astability, Monostability operation.

Application of Op-Amp: inverting and non-inverting amplifier, Adder, comparator,Integrator and Differentiator.

Voltage to frequency characteristics of NE/ SE 566 IC.

Variability Voltage Regulator using IC LM317.

EE8511 CONTROL AND INSTRUMENTATION LABORATORY

LIST OF EXPERIMENTS-CONTROL SYSTEM

P, PI and PID controllers

Stability Analysis

Modeling of Systems – Machines, Sensors and Transducers

Design of Lag, Lead and Lag-Lead Compensators

Position Control Systems

Synchro-Transmitter- Receiver and Characteristics Simulation of Control Systems by Mathematical development tools

INSTRUMENTATION:

Bridge Networks –AC and DC Bridges

Dynamics of Sensors/Transducers

Temperature (b) pressure (c) Displacement (d) Optical (e) Strain (f) Flow

Power and Energy Measurement

Signal Conditioning

Instrumentation Amplifier

Analog – Digital and Digital –Analog converters (ADC and DACs)

Process Simulation

EE8661 POWER ELECTRONICS AND DRIVES LABORATORY

LIST OF EXPERIMENTS

Gate Pulse Generation using R, RC and UJT.

2Characteristics of SCR and TRIAC

3Characteristics of MOSFET and IGBT

4AC to DC half controlled converter

5AC to DC fully controlled Converter

6Step down and step up MOSFET based choppers

7IGBT based single phase PWM inverter

GBT based three phase PWM inverter

9AC Voltage controller

Switched mode power converter.

Simulation of PE circuits **(1Φ** & **3Φ** semi converters, **1Φ** & **3Φ** full converters, DC-DC converters, AC voltage controllers).

Characteristics of GTO & IGCT.

Characteristics of PMBLDC motor

EE8681 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

LIST OF EXPERIMENTS

Simple arithmetic operations: addition / subtraction / multiplication / division.

2Programming with control instructions:

Ascending / Descending order, Maximum / Minimum of numbers.

Programs using Rotate instructions.

Hex / ASCII / BCD code conversions.

Interface Experiments: with 8085

A/D Interfacing. & D/A Interfacing.

4Traffic light controller.

5I/O Port / Serial communication

6Programming Practices with Simulators/Emulators/open source

7Read a key ,interface display

8Demonstration of basic instructions with 8051 Micro controller execution, including:

Conditional jumps & looping

Calling subroutines.

Programming I/O Port and timer of 8051

study on interface with A/D & D/A

Study on interface with DC & AC motors

Application hardware development using embedded processors.

EE8711 POWER SYSTEM SIMULATION LABORATORY

LIST OF EXPERIMENTS

Computation of Transmission Line Parameters

Formation of Bus Admittance and Impedance Matrices and Solution of Networks

3Power Flow Analysis using Gauss-Seidel Method

4Power Flow Analysis using Newton Raphson Method

5Symmetric and unsymmetrical fault analysis

6Transient stability analysis of SMIB System

7Economic Dispatch in Power Systems

8Load – Frequency Dynamics of Single- Area and Two-Area Power Systems

9State estimation: Weighted least square estimation

EE8712 RENEWABLE ENERGY SYSTEMSLABORATORY

LIST OF EXPERIMENTS

Simulation study on Solar PV Energy System.

Experiment on **"VI**-Characteristics and Efficiency of 1kWp Solar PV **System".**

Experiment on **"Shadowing** effect & diode based solution in 1kWp Solar PV **System".**

Experiment on Performance assessment of Grid connected and Standalone1kWp SolarPower

Simulation study on Wind Energy Generator.

Experiment on Performance assessment of micro Wind Energy Generator.

7Simulation study on Hybrid (Solar-Wind) Power System.

Experiment on Performance Assessment of Hybrid (Solar-Wind) Power System.

9Simulation study on Hydel Power.

EQUIPMENT COST DETAILS

S.NO	EQUIPMENT	COST
1	Experiment on VI characteristics and efficiency of 1Kwp Solar PV system	Rs 1,66,380
2	Microcontroller based PV Emulator (100 W, 24 V)	Rs 77, 880
3	Experiment on performance assessment of micro wind energy system	Rs 1,13,280
4	DC Shunt	
5	10 KVA UPS (Exide EL Batteries)	2,05,000
6	ETAP 7.0 version	3,50,000
7	EPSON EB-SO3 Projector	28281.5
8	Function Generator	55300
9	CRO	139300
10	VARTEC DIGITAL POWER SUPPLY 30V/2A DUAL 3002-2D2	65000
11	Speed control of DC motor using 3 Phase Rectifier	57,495.00
12	Speed control of Phase induction motor using PWM Inverter Module DSP Based closed loop Drive for Induction Motor	108,823.00
13	Induction motor speed control using FPGA	108,952.00
14	DSP Based Chopper DC motor Drive Module	108,952.00
15	HP 3330 Series PC 500GB, 7200 RPM SATA Hard Drive 4 GB, DDR 3-**1333(1 X 4 GB), intel core i3**-2120, 3.3 G, 3M, 4D 2000CPU	202,125.00

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

EQUIPMENT COST DETAILS

S.NO	EQUIPMENT	COST
1	Solar PV	Rs 1,66,380
2	PV Emulator	Rs 77, 880
3	Micro Wind	Rs 1,13,280
4	DC Shunt	
5	Exide EL Batteries	2,05,000
6	ETAP 7.0 version	3,50,000
7	EPSON EB-SO3 Projector	28281.5
8	Function Generator	55300
9	CRO	139300
10	Vartec Digital Power Supply	65000
11	Speed control of DC motor using 3 Phase Rectifier	57,495.00
12	PWM Inverter Module	108,823.00
13	Induction motor	108,952.00
14	Chopper DC motor Drive Module	108,952.00
15	HP 3330 Series PC	202,125.00

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Semester -I

GE3171 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C

0 0 4 2

COURSE OBJECTIVES:

- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To practice various computing strategies for Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

EXPERIMENTS:

Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation)
11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc.

COURSE OUTCOMES: **TOTAL: 60 PERIODS**

On completion of the course, students will be able to:

CO1: Develop algorithmic solutions to simple computational problems

CO2: Develop and execute simple Python programs.
CO3: Implement programs in Python using conditionals and loops for solving problems.
CO4: Deploy functions to decompose a Python program.
CO5: Process compound data using Python data structures.
CO6: Utilize Python packages in developing software applications.

TEXT BOOKS:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021.
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

BS3171 PHYSICS AND CHEMISTRY LABORATORY L T P C
0 0 4 2

PHYSICS LABORATORY : (Any Seven Experiments)

COURSE OBJECTIVES:

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student an active participant in each part of all lab exercises.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wavelength of the laser using grating

6. Air wedge - Determination of thickness of a thin sheet/wire
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
   b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamics kit.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the students should be able to

- Understand the functioning of various physics laboratory equipment.
- Use graphical models to analyze laboratory data.
- Use mathematical models as a medium for quantitative reasoning and describing physical reality.
- Access, process and analyze scientific information.
- Solve problems individually and collaboratively.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

COURSE OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in a water sample.

- Split the first experiment into two

3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.

12. Estimation of sodium /potassium present in water using a flame photometer.
13. Preparation of nanoparticles (TiO2/ZnO/CuO) by Sol-Gel method.
14. Estimation of Nickel in steel
15. Proximate analysis of Coal

TOTAL : 30 PERIODS

COURSE OUTCOMES:

- To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
- To determine the amount of metal ions through volumetric and spectroscopic techniques
- To analyse and determine the composition of alloys.
- To learn simple method of synthesis of nanoparticles
- To quantitatively analyse the impurities in solution by electroanalytical techniques

TEXT BOOKS :

1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (2009).

GE3271 ENGINEERING PRACTICES LABORATORY L T P C
0 0 4 2

COURSE OBJECTIVES:

The main learning objective of this course is to provide hands on training to the students in:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in commonhousehold wood work.

2. Wiring various electrical joints in common household electrical wire Work.

3. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.

4. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES 15

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers,elbows and other components which are commonly used in household.

b) Preparing plumbing line sketches.

c) Laying pipe connection to the suction side of a pump

d) Laying pipe connection to the delivery side of a pump.

e) Connecting pipes of different materials: Metal, plastic and flexible pipes used inhousehold appliances.

WOOD WORK:

a) Sawing,

b) Planing and

c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:

a) Studying joints in door panels and wooden furniture

b) Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES 15

a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
b) Staircase wiring
c) Fluorescent Lamp wiring with introduction to CFL and LED types.
d) Energy meter wiring and related calculations/ calibration
e) Study of Iron Box wiring and assembly
f) Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)
g) Study of emergency lamp wiring/Water heater

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

b) Practicing gas welding.

BASIC MACHINING WORK:

a) (simple)Turning.

b) (simple)Drilling.

c) (simple)Tapping.

ASSEMBLY WORK:

a) Assembling a centrifugal pump.

b) Assembling a household mixer.

c) Assembling an airconditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES 15

SOLDERING WORK:

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

a) Study an elements of smart phone..

b) Assembly and dismantle of LED TV.

c) Assembly and dismantle of computer/ laptop

TOTAL : 60 PERIODS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

- Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
- Wire various electrical joints in common household electrical wire work.
- Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
- Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

CS3271 **PROGRAMMING IN C LABORATORY** **L T P C**
0 0 4 2

COURSE OBJECTIVES:

- To familiarise with C programming constructs.
- To develop programs in C using basic constructs.
- To develop programs in C using arrays.
- To develop applications in C using strings, pointers, functions.
- To develop applications in C using structures.
- To develop applications in C using file processing.

LIST OF EXPERIMENTS:

Note: The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.

1. I/O statements, operators, expressions
2. decision-making constructs: if-else, goto, switch-case, break-continue
3. Loops: for, while, do-while
4. Arrays: 1D and 2D, Multi-dimensional arrays, traversal
5. Strings: operations
6. Functions: call, return, passing parameters by (value, reference), passing arrays to function.
7. Recursion
8. Pointers: Pointers to functions, Arrays,Strings, Pointers to Pointers, Array of Pointers
9. Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.
10. Files: reading and writing, File pointers, file operations, random access, processor directives.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to CO1: Demonstrate knowledge on C programming constructs. CO2: Develop programs in C using basic constructs.

CO3: Develop programs in C using arrays.

CO4: Develop applications in C using strings, pointers, functions. CO5: Develop applications in C using structures.

CO6: Develop applications in C using file processing.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2015.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education, 2018.
2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
3. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.
4. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second
5. Edition, Oxford University Press, 2013.
6. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.

GE8161 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY

LIST OF PROGRAMS:

Compute the GCD of two numbers.
Find the square root of a number (Newton's method)
Exponentiation (power of a number)
Find the maximum of a list of numbers
Linear search and Binary search
Selection sort, Insertion sort
Merge sort
First n prime numbers

Multiply matrices
Programs that take command line arguments (word count)
Find the most frequent words in a text read from a file
Simulate elliptical orbits in Pygame
Simulate bouncing ball using Pygame

AVAILABLE PLATFORM:

Python 3 interpreter for Windows/Linux

Semester –II

CS8261 C PROGRAMMING

LIST OF EXPERIMENTS:

Programs using I/O statements and expressions.
Programs using decision-making constructs.
Write a program to find whether the given year is leap year or Not? (Hint: not every centurion year is a leap. For example 1700, 1800 and 1900 is not a leap year)
Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
Check whether a given number is Armstrong number or not?
Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions.

if it is a perfect cube.

4 if it is a multiple of 4 and divisible by 6.

3 if it is a prime number.

Sort the numbers based on the weight in the increasing order as shown below <10,its weight>,<36,its weight><89,its weight>
Populate an array with height of persons and find how many persons are above the average height.

Populate a two dimensional array with height and weight of persons and compute the Body Mass Index of the individuals.

Given a string "a$bcd./fg" find its reverse without changing the position of special characters. (Example input:a@gh%;j and output:j@hg%;a)

Convert the given decimal number into binary, octal and hexadecimal numbers using user defined functions.

From a given paragraph perform the following using built-in functions:

Find the total number of words.

Capitalize the first word of each sentence.

Replace a given word with another word.

Solve towers of Hanoi using recursion.

Sort the list of numbers using pass by reference.

Generate salary slip of employees using structures and pointers.

Compute internal marks of students for five different subjects using structures and functions.

Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.

Count the number of account holders whose balance is less than the minimum balance using sequential access file.

Mini project

Create a "Railway reservation system" with the following modules

Booking

Availability checking

Cancellation Prepare

chart

AVAILABLE PLATFORM:

Turbo C++ software

Semester –III

CS8381 DATA STRUCTURES

LABORATORY LIST OF EXPERIMENTS:

Array implementation of Stack and Queue ADTs
Array implementation of List ADT
Linked list implementation of List, Stack and Queue ADTs
Applications of List, Stack and Queue ADTs
Implementation of Binary Trees and operations of Binary Trees
Implementation of Binary Search Trees
Implementation of AVL Trees
Implementation of Heaps using Priority Queues.
Graph representation and Traversal algorithms
Applications of Graphs
Implementation of searching and sorting algorithms
Hashing – any two collision techniques

AVAILABLE PLATFORM:

Turbo C++ software

CS8383 OBJECT ORIENTED PROGRAMMING LABORATORY

LIST OF EXPERIMENTS

Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e domestic or commercial). Compute the bill amount using the following tariff.

If the type of the EB connection is domestic, calculate the amount to be paid as follows:

First 100 units - Rs. 1 per unit

101-200 units - Rs. 2.50 per unit

201 -500 units - Rs. 4 per unit

> 501 units - Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

First 100 units - Rs. 2 per unit

101-200 units - Rs. 4.50 per unit

201 -500 units - Rs. 6 per unit

501 units - Rs. 7 per unit

Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yento INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.

Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.

Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementations.

Write a program to perform string operations using ArrayList. Write functions for the following

Append - add at end

Insert – add at particular index

Search

List all string starts with given letter

Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle

and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

Write a Java program to implement user defined exception handling.

Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

Write a java program to find the maximum value from the given type of elements using a generic function.

Design a calculator using event-driven programming paradigm of Java with the following options.

Decimal manipulations

Scientific manipulations

Develop a mini project for any application using Java concepts.

AVAILABLE PLATFORM:

Java SE 8 Platform

CS8382 DIGITAL SYSTEMS

LABORATORY LIST OF EXPERIMENTS

Verification of Boolean Theorems using basic gates.

Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters.

Design and implement Half/Full Adder and Subtractor.

Design and implement combinational circuits using MSI devices:

4 – bit binary adder / subtractor

Parity generator / checker

Magnitude Comparator

Application using multiplexers

Design and implement shift-registers.

Design and implement synchronous counters.

Design and implement asynchronous counters.

Coding combinational circuits using HDL.

Coding sequential circuits using HDL.

Design and implementation of a simple digital system (Mini Project).

AVAILABLE PLATFORM (HARDWARE):

Digital trainer kits - 30

Digital ICs required for the experiments in sufficient numbers

SOFTWARE:

HDL simulator

Semester – IV

CS8481 DATABASE MANAGEMENT SYSTEMS

LIST OF EXPERIMENTS

Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
Database Querying – Simple queries, Nested queries, Sub queries and Joins
Views, Sequences, Synonyms
Database Programming: Implicit and Explicit Cursors
Procedures and Functions
Triggers
Exception Handling
Database Design using ER modeling, normalization and Implementation for any application
Database Connectivity with Front End Tools
Case Study using real life database applications

AVAILABLE PLATFORM

ORACLE DATABSE 11G, VISUAL BASIC 6.0

CS8461 OPERATING SYSTEMS

LIST OF EXPERIMENTS

Basics of UNIX commands
Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir
Write C programs to simulate UNIX commands like cp, ls, grep, etc.
Shell Programming
Write C programs to implement the various CPU Scheduling Algorithms
Implementation of Semaphores
Implementation of Shared memory and IPC
Bankers Algorithm for Deadlock Avoidance
Implementation of Deadlock Detection Algorithm
Write C program to implement Threading & Synchronization Applications
Implementation of the following Memory Allocation Methods for fixed partition
First Fit b) Worst Fit c) Best Fit
Implementation of Paging Technique of Memory Management
Implementation of the following Page Replacement Algorithms
FIFO b) LRU c) LFU
Implementation of the various File Organization Techniques
Implementation of the following File Allocation Strategies
a) Sequential b) Indexed c) Linked

AVAILABLE PLATFORM

Popular SSH and Telnet Client

Semester – V

EC8681 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

LIST OF EXPERIMENTS:

8086 Programs using kits and MASM

Basic arithmetic and Logical operations
Move a data block without overlap
Code conversion, decimal arithmetic and Matrix operations.
Floating point operations, string manipulations, sorting and searching
Password checking, Print RAM size and system date
Counters and Time Delay

Peripherals and Interfacing Experiments

Traffic light controller
Stepper motor control
Digital clock
Key board and Display
Printer status
Serial interface and Parallel interface
A/D and D/A interface and Waveform Generation

8051 Experiments using kits and MASM

Basic arithmetic and Logical operations
Square and Cube program, **Find 2's complement of a number**
Unpacked BCD to ASCII

LAB EQUIPMENT:

HARDWARE:

8086 development kits - 30 nos
Interfacing Units - Each 10 nos
Microcontroller - 30 nos

SOFTWARE:

Intel Desktop Systems with MASM - 30 nos
8086 Assembler
8051 Cross Assembler

CS8582 OBJECT ORIENTED ANALYSIS AND DESIGN

LIST OF EXPERIMENTS:

Identify a software system that needs to be developed.
Document the Software Requirements Specification (SRS) for the identified system.
Identify use cases and develop the Use Case model.
Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
Using the identified scenarios, find the interaction between objects and represent them Using UML Sequence and Collaboration Diagrams

Draw relevant State Chart and Activity Diagrams for the same system.
Implement the system as per the detailed design
Test the software system for all the scenarios identified as per the usecase diagram
Improve the reusability and maintainability of the software system by applying appropriate design patterns.
Implement the modified system and test it for various scenarios

SUGGESTED DOMAINS FOR MINI-PROJECT:

Passport automation system.
Book bank
Exam registration
Stock maintenance system.
Online course reservation system
Airline/Railway reservation system
Software personnel management system
Credit card processing
e-book management system
Recruitment system
Foreign trading system
Conference management system
BPO management system
Library management system
Student information system

AVAILABLE PLATFORM

Windows 7 or higher
ArgoUML that supports UML 1.4 and higher
Selenium, JUnit or Apache JMeter

CS8581 NETWORKS

LABORATORY LIST OF EXPERIMENTS

Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and traceroute PDUs using a network protocol analyzer and examine.
Write a HTTP web client program to download a web page using TCP sockets.
Applications using TCP sockets like:

Simulation of DNS using UDP sockets.
Write a code simulating ARP /RARP protocols.
Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
Study of TCP/UDP performance using Simulation tool.
Simulation of Distance Vector/ Link State Routing algorithm.
Performance evaluation of Routing protocols using Simulation tool.
Simulation of error correction code (like CRC).

AVAILABLE PLATFORM

C / C++ / Java / Python Compiler
Network simulator like NS2

Semester – VI

CS8661 INTERNET PROGRAMMING LABORATORY

LIST OF EXPERIMENTS

Create a web page with the following using HTML
To embed a map in a web page
To fix the hot spots in that map
Show all the related information when the hot spots are clicked.
Create a web page with the following.
Cascading style sheets.
Embedded style sheets.
Inline style sheets. Use our college information for the web pages.
Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
Write programs in Java using Servlets:
To invoke servlets from HTML forms
Session tracking using hidden form fields and Session tracking for a hit count
Write programs in Java to create three-tier applications using servlets for conducting online examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
Install TOMCAT web server. Convert the static web pages of programs into dynamic web pages using servlets (or JSP) and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
Redo the previous task using JSP by converting the static web pages into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database.
Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document
i. Validate the form using PHP regular expression.
PHP stores a form data into database.
Write a web service for finding what people think by as**king 500 people's opinion for any**

AVAILABLE PLATFORM

Dream Weaver, MySQL, Apache Server, WAMP/XAMPP

2. CS8662 MOBILE APPLICATION DEVELOPMENT

LIST OF EXPERIMENTS

Develop an application that uses GUI components, Font and Colours
Develop an application that uses Layout Managers and event listeners.
Write an application that draws basic graphical primitives on the screen.
Develop an application that makes use of databases.
Develop an application that makes use of Notification Manager
Implement an application that uses Multi-threading
Develop a native application that uses GPS location information
Implement an application that writes data to the SD card.
Implement an application that creates an alert upon receiving a message
Write a mobile application that makes use of RSS feed
Develop a mobile application to send an email.
Develop a Mobile application for simple needs (Mini Project)

AVAILABLE PLATFORM

Standalone desktops with Windows and Android Mobile Application development Tools with appropriate emulators and debuggers.

Semester – VI

CS8711 CLOUD COMPUTING

LIST OF EXPERIMENTS

Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
Install Google App Engine. Create *HELLO WORLD* app and other simple web applications using python/java.
Use GAE launcher to launch the web applications.
Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
Find a procedure to transfer the files from one virtual machine to another virtual machine.
Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
Install Hadoop single node cluster and run simple applications like wordcount.

AVAILABLE PLATFORM

Configure various virtualization tools such as Virtual Box, VMware workstation.
Design and deploy a web application in a PaaS environment.
Learn how to simulate a cloud environment to implement new schedulers.
Install and use a generic cloud environment that can be used as a private cloud.
Manipulate large data sets in a parallel environment.

2. IT8761 SECURITY

LIST OF EXPERIMENTS

Perform encryption, decryption using the following substitution techniques
Ceaser cipher, (ii) playfair cipher iii) Hill Cipher iv) Vigenere cipher

Perform encryption and decryption using following transposition techniques i) Rail fence ii) row & Column Transformation

Apply DES algorithm for practical applications.

Apply AES algorithm for practical applications.

Implement RSA Algorithm using HTML and JavaScript

Implement the Diffie-Hellman Key Exchange algorithm for a given problem.

Calculate the message digest of a text using the SHA-1 algorithm.

Implement the SIGNATURE SCHEME - Digital Signature Standard.

Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w.
Automated Attack and Penetration Tools

Defeating Malware
Building Trojans ii) Rootkit Hunter

AVAILABLE PLATFORM

C / C++ / Java compiler GnuPG, Snort, N-Stalker

CSE DEPARTMENT COMPUTER LABORATORY DETAILS

Technopark System Details

Model	PROCESSOR	HARD DISK	RAM	MOTHER BOARD TYPE	MONITOR	Numbers
HP	**INTEL®CORE™** i3-2120-CPU@3.30GHz	500 GB	8GB & 4 GB	Foxconn 17A0	HP	50
Acer Veriton Series-Black	Intel Core 2 Quad CPU @ 2.50 GHz	320 GB	2GB	P35/G33/G31	ACER	30
Lenovo	Intel Core 2 duo CPU @ 2.66 GHz	160 GB	2 GB	P35/G33/G31	Lenovo	20

PRINTER & SCANNER DETAILS

PRINTER	NUMNBER
HP Laser Printer	3
EPSON Dot Matrix	5
HP Scanner	1

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

Process Control Laboratory

S.NO	Name of Equipment	Cost of Equipment
1	Flow Process Station Trainer	Rs 1,20,000
2	Pressure Process Station Trainer	Rs.1,30,000
3	Temperature Process Station Trainer	Rs.1,20,000
4	Level Precess Station Trainer	Rs.1,15,000
5	Pneumatic Control valve with and Without Poisitioner	Rs.60,000
6	PLC Based level control Trainer	Rs.80,000
7	Cascade Control system Trainer	Rs.1,20,000
8	Interacting and Non Interacting System Trainer	Rs.60,000
9	Feed forward Control system Trainer	Rs.1,60,000

Industrial Instrumentation Lab

1	LEVEL MEASUREMENT USING d/p TRANSMITTER	Rs.96000
2	LEVEL SWITCHES AND LEVEL MEASUREMENT USING	Rs.85000

Industrial automation laboratory

1	CIMPLICITY HMI (SCADA Software)	75,000
2	Distributed Control System	5,66,672
3	Advanced PLC trainer	1,02,545

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

LABORATORY DETAILS

EI8361 MEASUREMENTS AND TRANSDUCERS LABORATORY

LIST OF EXPERIMENTS

Displacement versus output voltage characteristics of a potentiometric transducer.
Characteristics of Strain gauge and Load cell.
Characteristics of LVDT, Hall Effect transducer and Photoelectric tachometer.
Characteristics of LDR, thermistor and thermocouple (J, K, E types).
Step response characteristic of RTD and thermocouple.
Temperature measurements using RTD with three and four leads.
Wheatstone and Kelvin's bridge for measurement of resistance.
Schering Bridge for capacitance measurement and Anderson Bridge for inductance measurement
Measurement of Angular displacement using resistive and capacitive transducer.
Calibration of Single-phase Energy meter and wattmeter.
Calibration of Ammeter and Voltmeter using Shunt type potentiometer.

EI8561 INDUSTRIAL INSTRUMENTATION LABORATORY

LIST OF EXPERIMENTS

Measurement of speed, torque and vibration
Calibration of ammeter, voltmeter and wattmeter using multifunction calibrator
Calibration of pressure gauge using dead weight tester.
Measurement of level using d/p transmitter and fibre optics system.
Measurement of flow using
Discharge coefficient of orifice plate
Calibration of Rotameter.
Design and Testing of Electromagnetic Flow meters.
Measurement of temperature using IR thermometer and IC sensor
Measurement of Absorbance and Transmittance of Test solutions using UV-Spectrometer.
Measurement of Conductivity, Moisture and Viscosity of test solutions.
Standardization and measurement of pH values of different solutions
Measurement and analysis of ECG and pulse rate.

EI8661 PROCESS CONTROL LABORATORY

LIST OF EXPERIMENTS:

Simulation Based Experiments
Simulation of lumped /distributed parameter system
Mathematical model of a typical industrial process using nonparametric identification methods

Tuning of PID Controller for mathematically described processes
PID Enhancements (Cascade and Feed-forward Control Schemes)
Design and Implementation of Multi-loop PID Controller on the simulated model of a typical industrial process.
Study of AC and DC drives.

Hardware based experiments

Characteristics of Pneumatically Actuated Control Valve (with and without Positioner).
Study and control of flow process using Compact Flow Control Unit.
Control of Level and Pressure using Process Control Training Plant.
Design and implementation of ON/OFF Controller for the Temperature Process.
Design and implementation of Interacting and non-interacting system
Design and implementation of adaptive or model predictive control schemes

EI8761 INDUSTRIAL AUTOMATION LABORATORY

LIST OF EXPERIMENTS:

Study of PLC field device interface modules (AI,AO,DI,DO modules)
Programming Logic Gates Function in PLC
Implementing Mathematical Operations in PLC
Programming Jump-to-subroutine & return operations in PLC
PLC Exercises:- 1. Traffic Light Control and Filling/Draining Control Operation
PLC Exercise: 1. Reversal of DC Motor Direction 2. ON/OFF Controller for Thermal Process
PC based control of Level Process
On-line Monitoring and Control of a Pilot plant using DCS
PLC based Control of Flow Process
Study of Foundation Fieldbus /IOT/Wireless HART Enabled Transmitter

EI8762 INSTRUMENTATION SYSTEM DESIGN LABORATORY

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LIST OF EXPERIMENTS:

Design of Instrumentation amplifier.
Design of active filters – LPF, HPF and BPF
Design of regulated power supply and design of V/I and I/V converters.
Design of linearizing circuits and cold–junction compensation circuit for thermocouples.
Design of signal conditioning circuit for strain gauge and RTD.
Design of orifice plate and rotameter.
Design of Control valve (sizing and flow-lift characteristics)
Design of PID controller (using operational amplifier and microprocessor)
Design of a multi-channel data acquisition system
Design of multi range DP transmitter
Piping and Instrumentation Diagram – case study.
Preparation of documentation of instrumentation project and project scheduling for the above case study. (Process flow sheet, instrument index sheet and instrument specifications sheet,job scheduling, installation procedures and safety regulations).

ANNA UNIVERSITY, CHENNAI

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING REGULATIONS – 2017

GE3171 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C

0 0 4 2

COURSE OBJECTIVES:

- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To practice various computing strategies for Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

EXPERIMENTS:

Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation)
11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

On completion of the course, students will be able to:

CO1: Develop algorithmic solutions to simple computational problems

CO2: Develop and execute simple Python programs.

CO3: Implement programs in Python using conditionals and loops for solving problems..
CO4: Deploy functions to decompose a Python program.
CO5: Process compound data using Python data structures.
CO6: Utilize Python packages in developing software applications.

TEXT BOOKS:

1. Allen B. Downey, "Think Python : How to Think like a Computer Scientist", 2nd Edition,
   O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

BS3171 PHYSICS AND CHEMISTRY LABORATORY L T P C
0 0 4 2

PHYSICS LABORATORY : (Any Seven Experiments)

COURSE OBJECTIVES:

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student an active participant in each part of all lab exercises.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wavelength of the laser using grating
6. Air wedge - Determination of thickness of a thin sheet/wire

7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
   b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamics kit.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the students should be able to

- Understand the functioning of various physics laboratory equipment.
- Use graphical models to analyze laboratory data.
- Use mathematical models as a medium for quantitative reasoning and describing physical reality.
- Access, process and analyze scientific information.
- Solve problems individually and collaboratively.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

COURSE OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in a water sample.

- Split the first experiment into two

3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.
12. Estimation of sodium /potassium present in water using a flame photometer.
13. Preparation of nanoparticles (TiO_2/ZnO/CuO) by Sol-Gel method.

14. Estimation of Nickel in steel
15. Proximate analysis of Coal

TOTAL : 30 PERIODS

COURSE OUTCOMES :

- To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
- To determine the amount of metal ions through volumetric and spectroscopic techniques
- To analyse and determine the composition of alloys.
- To learn simple method of synthesis of nanoparticles
- To quantitatively analyse the impurities in solution by electroanalytical techniques

TEXT BOOKS :

1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (2009).

GE3271	**ENGINEERING PRACTICES LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

COURSE OBJECTIVES:

The main learning objective of this course is to provide hands on training to the students in:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in commonhousehold wood work.
2. Wiring various electrical joints in common household electrical wire work.
3. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
4. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES **15**

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers,elbows and other components which are commonly used in household.
b) Preparing plumbing line sketches.
c) Laying pipe connection to the suction side of a pump d)
Laying pipe connection to the delivery side of a pump.
e) Connecting pipes of different materials: Metal, plastic and flexible pipes used inhousehold appliances.

WOOD WORK:

a) Sawing,

b) Planing and
c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:

a) Studying joints in door panels and wooden furniture
b) Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES 15

a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
b) Staircase wiring
c) Fluorescent Lamp wiring with introduction to CFL and LED types.
d) Energy meter wiring and related calculations/ calibration
e) Study of Iron Box wiring and assembly
f) Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)
g) Study of emergency lamp wiring/Water heater

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding. b) Practicing gas welding.

BASIC MACHINING WORK:

a) (simple)Turning. b) (simple)Drilling. c) (simple)Tapping.

ASSEMBLY WORK:

a) Assembling a centrifugal pump. b) Assembling a household mixer. c) Assembling an airconditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES 15

SOLDERING WORK:

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

a) Study an elements of smart phone..
b) Assembly and dismantle of LED TV.
c) Assembly and dismantle of computer/ laptop

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

TOTAL: 60 PERIODS

- Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
- Wire various electrical joints in common household electrical wire work.
- Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
- Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

EC3271	CIRCUIT ANALYSIS LABORATORY	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

- To gain hands- on experience in Thevenin & Norton theorem, KVL & KCL, and Superposition Theorems.
- To understand the working of RL,RC and RLC circuits

List of Experiments:

1. Verifications of KVL & KCL.
2. Verifications of Thevenin & Norton theorem.
3. Verification of Superposition Theorem.
4. Verification of maximum power transfer Theorem
5. Determination of Resonance Frequency of Series & Parallel RLC Circuits.
6. Transient analysis of RL and RC circuits.

Laboratory Requirements:

Resistors, Capacitors, Inductors – sufficient quantities. Bread Boards – 15 Nos.
CRO (30MHz) – 10 Nos.
Function Generators (3MHz) – 10 Nos.
Dual Regulated Power Supplies (0 – 30V) – 10 Nos. **TOTAL : 30 PERIODS**

COURSE OUTCOMES:

At the end of the course, the student will be able to

- Design RL and RC circuits.
- Verify Thevinin & Norton theorem KVL & KCL, and Super Position Theorems.

TEXT BOOKS

1. Hayt JackKemmerly, Steven Durbin, "Engineering Circuit Analysis", McGraw Hill education, 9th Edition, 2018.
2. Charles K. Alexander & Mathew N.O.Sadiku, "Fundamentals of Electric Circuits", McGraw- Hill, 2nd Edition, 2003.
3. Joseph Edminister and Mahmood Nahvi, "Electric Circuits, Schaum's Outline Series", Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition Reprint 2016.

REFERENCES

1. David Bell, "Fundamentals of Electric Circuits", Oxford University press, 7th Edition,2009
2. John O Mallay, Schaum's Outlines "Basic Circuit Analysis", The Mc Graw Hill companies, 2nd Edition, 2011.
3. A.Bruce Carlson, "Cicuits: Engineering Concepts and Analysis of Linear Electric Circuits, Cengage Learning, India Edition 2nd Indian Reprint 2009.
4. Allan H.Robbins, Wilhelm C.Miller, "Circuit Analysis Theory and Practice", Cengage Learning, Fifth Edition, 1st Indian Reprint 2013

1. EC8361 Analog and Digital Circuits Laboratory

LIST OF ANALOG EXPERIMENTS

Design of Regulated Power supplies
Frequency Response of CE, CB, CC and CS amplifiers
Darlington Amplifier
Differential Amplifiers – Transfer characteristics, CMRR Measurement
Cascode and Cascade amplifiers
Determination of bandwidth of single stage and multistage amplifiers
Analysis of BJT with Fixed bias and Voltage divider bias using Spice
Analysis of FET, MOSFET with fixed bias, self-bias and voltage divider bias using simulation software like Spice
Analysis of Cascode and Cascade amplifiers using Spice
Analysis of Frequency Response of BJT and FET using Spice

LIST OF DIGITAL EXPERIMENTS

Design and implementation of code converters using logic gates(i) BCD to excess-3 code and vice versa (ii) Binary to gray and vice-versa

Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC 7483
Design and implementation of Multiplexer and De-multiplexer using logic gates
Design and implementation of encoder and decoder using logic gates
Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters
Design and implementation of 3-bit synchronous up/down counter

2. EC8461 CIRCUITS DESIGN AND SIMULATION LABORATORY

DESIGN AND ANALYSIS OF THE FOLLOWING CIRCUITS

Series and Shunt feedback amplifiers-Frequency response, Input and output impedance
RC Phase shift oscillator and Wien Bridge Oscillator
Hartley Oscillator and Colpitts Oscillator
Single Tuned Amplifier
RC Integrator and Differentiator circuits
Astable and Monostable multivibrators
Clippers and Clampers SIMULATION USING SPICE (Using Transistor):
Tuned Collector Oscillator
Twin -T Oscillator / Wein Bridge Oscillator
Double and Stagger tuned Amplifiers
Bistable Multivibrator
Schmitt Trigger circuit with Predictable hysteresis
Analysis of power amplifier

EC8462 LINEAR INTEGRATED CIRCUITS LABORATORY

LIST OF EXPERIMENTS

Inverting, Non inverting and differential amplifiers.
Integrator and Differentiator.
Instrumentation amplifier
Active low-pass, High-pass and band-pass filters.
Astable & Monostable multivibrators using Op-amp
Schmitt Trigger using op-amp.
Phase shift and Wien bridge oscillators using Op-amp.
Astable and Monostable multivibrators using NE555 Timer.
PLL characteristics and its use as Frequency Multiplier, Clock synchronization
R-2R Ladder Type D- A Converter using Op-amp.
DC power supply using LM317 and LM723.

Study of SMPS SIMULATION USING SPICE:

Active low-pass, High-pass and band-pass filters using Op-amp
Astable and Monostable multivibrators using NE555 Timer.
A/ D converter
Analog multiplier

4.EC8562 DIGITAL SIGNAL PROCESSING LABORATORY

LIST OF EXPERIMENTS: MATLAB / EQUIVALENT SOFTWARE PACKAGE
Generation of elementary Discrete-Time sequences
Linear and Circular convolutions
Auto correlation and Cross Correlation
Frequency Analysis using DFT
Design of FIR filters (LPF/HPF/BPF/BSF) and demonstrates the filtering operation
Design of Butterworth and Chebyshev IIR filters (LPF/HPF/BPF/BSF) and demonstrate the filtering operations
DSP PROCESSOR BASED IMPLEMENTATION
Study of architecture of Digital Signal Processor
Perform MAC operation using various addressing modes
Generation of various signals and random noise
Design and demonstration of FIR Filter for Low pass, High pass, Band pass and Band stop filtering
Design and demonstration of Butter worth and Chebyshev IIR Filters for Low pass, High pass, Band pass and Band stop filtering
Implement an Up-sampling and Down-sampling operation in DSP Processor

5. EC8561 COMMUNICATION SYSTEMS LABORATORY

LIST OF EXPERIMENTS:
Signal Sampling and reconstruction
Time Division Multiplexing
AM Modulator and Demodulator

FM Modulator and Demodulator
Pulse Code Modulation and Demodulation
Delta Modulation and Demodulation
Line coding schemes
Simulation of ASK, FSK, and BPSK generation schemes
Simulation of DPSK, QPSK and QAM generation schemes
Simulation of signal constellations of BPSK, QPSK and QAM
Simulation of ASK, FSK and BPSK detection schemes
Simulation of Linear Block and Cyclic error control coding schemes
Simulation of Convolutional coding scheme 14. Communication link simulation

6.EC8563 COMMUNICATION NETWORKS LABORATORY

LIST OF EXPERIMENTS:
Implementation of Error Detection / Error Correction Techniques
Implementation of Stop and Wait Protocol and sliding window
Implementation and study of Goback-N and selective repeat protocols
Implementation of High Level Data Link Control
Implementation of IP Commands such as ping, Traceroute, nslookup.
Implementation of IP address configuration.
To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
Network Topology - Star, Bus, Ring
Implementation of distance vector routing algorithm
Implementation of Link state routing algorithm
Study of Network simulator (NS) and simulation of Congestion Control Algorithms using NS
Implementation of Encryption and Decryption Algorithms using any programming language

7.EC8681 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

LIST OF EXPERIMENTS: 8086 Programs using kits and MASM
Basic arithmetic and Logical operations
Move a data block without overlap
Code conversion, decimal arithmetic and Matrix operations.
Floating point operations, string manipulations, sorting and searching
Password checking, Print RAM size and system date
Counters and Time Delay Peripherals and Interfacing Experiments
Traffic light controller
Stepper motor control
Digital clock
Key board and Display
Printer status
Serial interface and Parallel interface
A/D and D/A interface and Waveform Generation 8051 Experiments using kits and MASM
Basic arithmetic and Logical operations
Square and Cube program, Find 2‘s complement of a number
Unpacked BCD to ASCII

8. EC8661 VLSI DESIGN LABORATORY

Part I: Digital System Design using HDL & FPGA (24 Periods)

Design an Adder (Min 8 Bit) using HDL. Simulate it using Xilinx/Altera Software and implement by Xilinx/Altera FPGA

Design a Multiplier (4 Bit Min) using HDL. Simulate it using Xilinx/Altera Software and implement by Xilinx/Altera FPGA

Design an ALU using HDL. Simulate it using Xilinx/Altera Software and implement by Xilinx/Altera FPGA

Design a Universal Shift Register using HDL. Simulate it using Xilinx/Altera Software and implement by Xilinx/Altera FPGA

Design Finite State Machine (Moore/Mealy) using HDL. Simulate it using Xilinx/Altera Software and implement by Xilinx/Altera FPGA

Design Memories using HDL. Simulate it using Xilinx/Altera Software and implement by Xilinx/Altera FPGA Compare pre synthesis and post synthesis simulation for experiments 1 to 6. Requirements: Xilinx ISE/Altera Quartus/ equivalent EDA Tools along with Xilinx/Altera/equivalent FPGA Boards

Part-II Digital Circuit Design (24 Periods)

Design and simulate a CMOS inverter using digital flow

Design and simulate a CMOS Basic Gates & Flip-Flops

Design and simulate a 4-bit synchronous counter using a Flip-Flops Manual/Automatic Layout Generation and Post Layout Extraction for experiments 7 to 9 Analyze the power, area and timing for experiments 7 to 9 by performing Pre Layout and Post Layout Simulations.

Part-III Analog Circuit Design (12 Periods)

Design and Simulate a CMOS Inverting Amplifier.

Design and Simulate basic Common Source, Common Gate and Common Drain Amplifiers. Analyze the input impedance, output impedance, gain and bandwidth for experiments 10 and 11 by performing Schematic Simulations.

Design and simulate simple 5 transistor differential amplifier. Analyze Gain, Bandwidth and CMRR by performing Schematic Simulations. Requirements: Cadence/Synopsis/ Mentor Graphics/Tanner/equivalent EDA Tools

EC8711 EMBEDDED LABORATORY

LIST OF EXPERIMENTS:

Study of ARM evaluation system

Interfacing ADC and DAC.

Interfacing LED and PWM.

Interfacing real time clock and serial port.

Interfacing keyboard and LCD.

Interfacing EPROM and interrupt.

Mailbox.

Interrupt performance characteristics of ARM and FPGA.

Flashing of LEDS.

Interfacing stepper motor and temperature sensor.

Implementing zigbee protocol with ARM.

10. EC8761 ADVANCED COMMUNICATION LABORATORY

LIST OF OPTICAL EXPERIMENTS

Measurement of connector, bending and fiber attenuation losses.
Numerical Aperture and Mode Characteristics of Fibers.
DC Characteristics of LED and PIN Photo diode.
Fiber optic Analog and Digital Link Characterization - frequency response(analog), eye diagram and BER (digital)

LIST OF WIRELESS COMMUNICATION EXPERIMENTS

Wireless Channel Simulation including fading and Doppler effects
Simulation of Channel Estimation, Synchronization & Equalization techniques
Analysing Impact of Pulse Shaping and Matched Filtering using Software Defined Radios
OFDM Signal Transmission and Reception using Software Defined Radios

VSWR and Impedance Measurement and Impedance Matching
Characterization of Directional Couplers, Isolators, Circulators
Gunn Diode Characteristics
Microwave IC – Filter Characteristics

11.EC8261 CIRCUITS AND DEVICES LABORATORY

Characteristics of PN Junction Diode
Zener diode Characteristics & Regulator using Zener diode
Common Emitter input-output Characteristics
Common Base input-output Characteristics
FET Characteristics 6. SCR Characteristics
Clipper and Clamper & FWR
Verifications Of Thevinin & Norton theorem
Verifications Of KVL & KCL
Verifications Of Super Position Theorem
verifications of maximum power transfer & reciprocity theorem
Determination Of Resonance Frequency of Series & Parallel RLC Circuits
Transient analysis of RL and RC circuits

TAMILNADU COLLEGE OF ENGINEERING, COIMBATORE – 641 659 DEPARTMENT OF MECHANICAL ENGINEERING

MAJOR EQUIPMENT DETAILS

Name of the Laboratory: MECHATRONICS LABORATORY

Sl. No.	Name of the Equipment	Quantity Available	Cost (Rs.)	Date of Purchase	Serial/Invoice No.
1	Pneumatic trainer Kit	1	1,07,315.00	04.08.2007	F/0438
2	Electro Pneumatic Trainer Kit	1	1,07,315.00	04.08.2007	F/0438
3	Electro Pneumatic Trainer Kit with PLC	1	1,92,904.00	04.08.2007	F/0438
4	Hydraulic Linear Actuation system trainer	1	2,29,434.00	04.08.2007	F/0438
5	Process Control Trainer	1	1,94,672.00	04.08.2007	F/0438
6	Servo controller using open loop and closed loop	1	1,39,048.00	04.08.2007	F/0438
7	Hydraulic, pneumatic and electric circuits simulation software	10	2,69,401.00	17.08.2007	T/0166

Name of the Laboratory: - MACHINE SHOP LABORATORY

Sl. No.	Name of the Equipment	Quantity Available	Cost (Rs.)	Date of Purchase	Serial/Invoice No.
1	Lathe -250N1	1	55392	15-07-1985	11/31
2	Lathe 250CI	1	56127	15-07-1985	12/30
3	Gear HobbingM/C	1	252000	14-01-1991	22/14754
4	Cylindrical Grinding Machine	1	131250	9/2/2012	35/164
5	Tool And Cutter Grinding Machine	1	89250	21-04-2015	36/364
6	Capstan Lathe	1	166436	20-05-2015	37/373
7	Centerless Grinding Machine	1	168000	15-06-2015	39/380

Name of Laboratory: CAD LABORATORY

Sl. No.	Name of the Equipment	Quantity Available	Cost (Rs.)	Date of Purchase	Serial/Invoice No.
1	AUTOCAD R12 AUTOCAD Designer	01 + 01 SET	61,036	28.10.1995	116
2	AUTOCAD R14	01	300,000	28.08.1998	69
3	IRONCAD 3D	01	300,000	26.10.1999	PCL/PROD/149
4	ANSYS 5.5	01 SEAT	155,000	04.01.2000	SWS0040
5	AUTOCAD 2OOO	11	220,000	12.01.2000	441
6	CMAS	5 (LATHE) 5 (MILLING)	100,000	08.09.2000	543
7	AUTODESK 4.0	20	800,000	22.09.2000	006/SOFT
8	PRO-E	UNLIMITED SEATS	187,000	20.09.2003	SA 70011
9	IDEAS , SOLID EDGE, UG, CNC SIMULATION SOFTWARE	7 (IDEAS) 1(UG) 5(SOLID EDGE) 5(CNC)	856,524	10.11.2003	ECPL/03-04/1045/TCE
10	HYDRAULIC AND PNEUMATIC SIMULATION SOFTWARE	5(HYDRAULIC) 5(PNEUMATIC)	269,401	01.09.2007	T/0166
11	COMPUTERS	49	1,069,519	15.12.07	358
12	CATIA V5	5	1,53,609	15.10.14	P/1415/045

Name of Laboratory : METROLOGY LABORATORY

Sl. No.	Name of the Equipment	Quantity Available	Cost (Rs.)	Date of Purchase	Serial/Invoice No.
1	Surface finish Measuring Equipment	1	81900.00	15/04/2015	360

Name of the Laboratory: - WELDING LABORATORY

Sl. No.	Name of the Equipment	Quantity Available	Cost (Rs.)	Date of Purchase	Serial/Invoice No.
1	Brazing Machine	1 NOS	54960.00	27.09.2013	97/27.09.2013

Name of the Laboratory:- Thermal Laboratory

Sl. No.	Name of the Equipment	Quantity Available	Cost (Rs.)	Date of Purchase	Serial/Invoice No.
1	Steam turbine	1	3, 75, 000	15.7.93	229-15.7.92
2	Boiler	1	1, 03, 740	7.12.93	2462-7.12.93
3	Air conductivity cycle test rig	1	80, 750	25.12.96	967/K.49/TRD
4	Multi cylinder diesel engine/Hydraulic loading	1	1, 23, 290	10.12.03	079 dt 10.12.03
5	4 cylinder four stroke diesel engine with electrical loading.	1	2, 83, 000	11.05.07	6 dt 11.05.07
6	Experimental Refrigeration Test Rig	1	1,08,000	15.02.17	338
7	Experimental air conditioning Test Rig	1	1,02,900	15.02.17	338
8	Two Stage Air Compressor Test Rig	1	73,500	15.02.17	338
9	Fluidized bed experimental cooling tower	1	59,885	05.05.18	SSMS089
10	HC refrigeration system test rig	1	98,088	05.05.18	SSMS089

Name of the Laboratory: CAM LABORATORY

Sl. No.	Name of the Equipment	Quantity Available	Cost (Rs.)	Date of Purchase	Serial/Invoice No.
1	CMT COMEEX – CNC Trainer Milling	1	4,00,000/-	-	-
2	CMT COMEEX – CNC Trainer Lathe	1	4,00,000/-	-	-
3	BATLIBOI SPRINT 16TC – CNC Turning Centre	1	16,82,000/-	06/01/2004	-
4	BFW-CNC Milling Machine	1	6,83,280-	06/07/2010	07/6/7/2010
5	Edgecam Software License 2012 R2	30 Seats for Simulation & 15 Seats for NC code	2,92,950/-	13/05/2013	Kriatec /Edgecam/ 13-14/05/013

TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE-641659

DEPARTMENT OF CIVIL ENGINEERING

LIST OF EXPERIMENTS

GE3171 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C

0 0 4 2

OBJECTIVES:

- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To practice various computing strategies for Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

EXPERIMENTS:

Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation)
11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc. **TOTAL: 60 PERIODS**

OUTCOMES:

On completion of the course, students will be able to:
CO1: Develop algorithmic solutions to simple computational problems
CO2: Develop and execute simple Python programs.
CO3: Implement programs in Python using conditionals and loops for solving problems.. CO4: Deploy functions to decompose a Python program.
CO5: Process compound data using Python data structures.
CO6: Utilize Python packages in developing software applications.

TEXT BOOKS:

1. Allen B. Downey, "Think Python : How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data‘‘, Third Edition, MIT Press, 2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

BS3171	PHYSICS AND CHEMISTRY LABORATORY	L T P C
		0 0 4 2

PHYSICS LABORATORY : (Any Seven Experiments)

OBJECTIVES:

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.

- To make the student as an active participant in each part of all lab exercises.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wave length of the laser using grating
6. Air wedge - Determination of thickness of a thin sheet/wire
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamics kit.

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of the course, the students should be able to

- Understand the functioning of various physics laboratory equipment.
- Use graphical models to analyze laboratory data.
- Use mathematical models as a medium for quantitative reasoning and describing physical reality.
- Access, process and analyze scientific information.
- Solve problems individually and collaboratively.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in water sample.
   - Split the first experiment into two
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.

9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.
12. Estimation of sodium /potassium present in water using flame photometer.
13. Preparation of nanoparticles (TiO_2/ZnO/CuO) by Sol-Gel method.
14. Estimation of Nickel in steel
15. Proximate analysis of Coal

TOTAL : 30 PERIODS

OUT COMES :

- To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
- To determine the amount of metal ions through volumetric and spectroscopic techniques
- To analyse and determine the composition of alloys.
- To learn simple method of synthesis of nanoparticles
- To quantitatively analyse the impurities in solution by electroanalytical techniques

TEXT BOOKS :

1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (2009).

GE3271 ENGINEERING PRACTICES LABORATORY L T P C

0 0 4 2

OBJECTIVES:

The main learning objective of this course is to provide hands on training to the students in:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in commonhousehold wood work.
2. Wiring various electrical joints in common household electrical wire work.
3. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
4. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES 15

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers,elbows and other components which are commonly used in household.
b) Preparing plumbing line sketches.
c) Laying pipe connection to the suction side of a pump d) Laying pipe connection to the delivery side of a pump.
e) Connecting pipes of different materials: Metal, plastic and flexible pipes used inhousehold appliances.

WOOD WORK:

a) Sawing,
b) Planing and
c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint. Wood Work Study:
a) Studying joints in door panels and wooden furniture
b) Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES 15

a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
b) Staircase wiring
c) Fluorescent Lamp wiring with introduction to CFL and LED types. d) Energy meter wiring and related calculations/ calibration
e) Study of Iron Box wiring and assembly
f) Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)
g) Study of emergency lamp wiring/Water heater

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
b) Practicing gas welding.

BASIC MACHINING WORK:

a) (simple)Turning.
b) (simple)Drilling.
c) (simple)Tapping.

ASSEMBLY WORK:

a) Assembling a centrifugal pump.
b) Assembling a household mixer.
c) Assembling an airconditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES 15

SOLDERING WORK:

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

a) Study an elements of smart phone..
b) Assembly and dismantle of LED TV.
c) Assembly and dismantle of computer/ laptop

TOTAL : 60 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to:

1. Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
2. Wire various electrical joints in common household electrical wire work.
3. Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
4. Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

BE3272 BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY **L T P C**

0 0 4 2

OBJECTIVES:

- To train the students in conducting load tests electrical machines
- To gain practical experience in experimentally obtaining the characteristics of electronic devices and rectifiers
- To train the students to measure three phase power and displacement

List of Experiments

1. Verification of ohms and Kirchhoff's Laws.
2. Three Phase Power Measurement
3. Load test on DC Shunt Motor.
4. Load test on Self Excited DC Generator
5. Load test on Single phase Transformer
6. Load Test on Induction Motor
7. Characteristics of PN and Zener Diodes
8. Characteristics of BJT, SCR and MOSFET
9. Design and analysis of Half wave and Full Wave rectifiers
10. Measurement of displacement of LVDT **TOTAL: 60 PERIODS**

OUTCOMES:

After completing this course, the students will be able to

CO1: Use experimental methods to verify the Ohm's law and Kirchhoff's Law and to measure three phase power

CO2: Analyze experimentally the load characteristics of electrical machines

CO3: Analyze the characteristics of basic electronic devices

CO4: Use LVDT to measure displacement

CE8211 COMPUTER AIDED BUILDING DRAWING

LIST OF EXPERIMENTS

Principles of planning, orientation and complete joinery details (Paneled and Glazed Doors and Windows)
Buildings with load bearing walls
Buildings with sloping roof
R.C.C. framed structures.
Industrial buildings – North light roof structures

CE8311 CONSTRUCTION MATERIALS LABORATORY

I. TEST ON FINE AGGREGATES

Grading of fine aggregates
Test for specific gravity and test for bulk density
Compacted and loose bulk density of fine aggregate

II. TEST ON COARSE AGGREGATE

Determination of impact value of coarse aggregate
Determination of elongation index
Determination of flakiness index
Determination of aggregate crushing value of coarse aggregate

III. TEST ON CONCRETE

Test for Slump
Test for Compaction factor
Test for Compressive strength - Cube & Cylinder
Test for Flexural strength

IV. TEST ON BRICKS AND BLOCKS

Test for compressive strength of bricks and blocks
Test for Water absorption of bricks and blocks
Determination of Efflorescence of bricks
Test on tiles

CE8361 SURVEYING LABORATORY

LIST OF EXPERIMENTS:

Chain Survey

Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset
Setting out works – Foundation marking using tapes single Room and Double Room

Compass Survey

3. Compass Traversing – Measuring Bearings & arriving included angles

Levelling - Study of levels and levelling staff

Fly levelling using Dumpy level &Tilting level

Check levelling

Theodolite - Study of Theodolite

Measurements of horizontal angles by reiteration and repetition and vertical angles

Determination of elevation of an object using single plane method when base is accessible/inaccessible.

Tacheometry – Tangential system – Stadia system

Determination of Tacheometric Constants

Heights and distances by stadia Tacheometry

Heights and distances by Tangential Tacheometry

Total Station - Study of Total Station, Measuring Horizontal and vertical angles

Traverse using Total station and Area of Traverse

Determination of distance and difference in elevation between two inaccessible points using Total station

CE8481 STRENGTH OF MATERIALS LABORATORY

LIST OF EXPERIMENTS

Tension test on steel rod
Compression test on wood
Double shear test on metal
Torsion test on mild steel rod
Impact test on metal specimen (Izod and Charpy)
Hardness test on metals (Rockwell and Brinell Hardness Tests)
Deflection test on metal beam
Compression test on helical spring
Deflection test on carriage spring
10.

CE8461 HYDRAULIC ENGINEERING LABORATORY

LIST OF EXPERIMENTS

A. Flow Measurement

Calibration of Rotameter
Calibration of Venturimeter / Orificemeter
Bernoulli's Experiment

B.Losses in Pipes

4.Determination of friction factor in pipes

5. Determination of min or losses

Pumps

Characteristics of Centrifugal pumps

Characteristics of Gear pump

Characteristics of Submersible pump

Characteristics of Reciprocating pump

Turbines

Characteristics of Pelton wheel turbine

Characteristics of Francis turbine/Kaplan turbine

Determination of Metacentric height

12.Determination of Metacentric height of floating bodies

CE8511 SOIL MECHANICS LABORATORY

DETERMINATION OF INDEX PROPERTIES

a. Specific gravity of soil solids

b. Grain size distribution – Sieve analysis

c. Grain size distribution - Hydrometer analysis d. Liquid limit and Plastic limit tests

e. Shrinkage limit and Differential free swell

DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS

a. Field density Test (Sand replacement method and core cutter method)

b. Determination of moisture – density relationship using standard Proctor compaction test. c. Determination of relative density (Demonstration only)

DETERMINATION OF ENGINEERING PROPERTIES

a. Permeability determination (constant head and falling head methods)

b. One dimensional consolidation test (Determination of Co-efficient of consolidation only) c. Direct shear test in cohesionless soil

d. Unconfined compression test in cohesive soil

e. Laboratory vane shear test in cohesive soil

f. Tri-axial compression test in cohesionless soil (Demonstration only)

g. California Bearing Ratio Test

CE8512 WATER AND WASTE WATER ANALYSIS LABORATORY

List of Experiments:

Determination of pH, Turbidity and conductivity
Determination of Hardness
Determination of Alkalinity and Acidity
Determination of Chlorides
Determination of Phosphates and Sulphates
Determination of iron and fluoride
Determination of Optimum Coagulant dosage
Determination of residual chlorine and available chlorine in bleaching powder
Determination of Oil, and Grease
Determination of suspended, settleable, volatile and fixed solids
Determination Dissolved Oxygen and BOD for the given sample
Determination of COD for given sample
Determination of SVI of Biological sludge and microscopic examination
Determination of MPN index of given water sample

CE8611 HIGHWAY ENGINEERING LABORATORY

I TEST ON AGGREGATES

Specific Gravity
Los Angeles Abrasion Test
Water Absorption of Aggregates

IITEST ON BITUMEN

Specific Gravity of Bitumen
Penetration Test
Viscosity Test
Softening Point Test
Ductility Test

IIITESTS ON BITUMINOUS MIXES

Stripping Test
Determination of Binder Content
Marshall Stability and Flow Values

BE8261 BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY

LIST OF EXPERIMENTS:

Load test on separately excited DCgenerator
Load test on Single phaseTransformer
Load test on Inductionmotor
Verification of Circuit Laws
Verification of CircuitTheorems
Measurement of three phasepower
Load test on DC shuntmotor.
Diode based applicationcircuits
Transistor based applicationcircuits
Study of CRO and measurement of ACsignals
Characteristics ofLVDT
Calibration ofRotometer
RTD andThermistor

ME8361 MANUFACTURING TECHNOLOGY LABORATORY–I

LIST OF EXPERIMENTS

Machining and Machining time estimations for:

- TaperTurning
- External Threadcutting
- Internal ThreadCutting
- EccentricTurning
- Knurling
- Square HeadShaping
- Hexagonal HeadShaping
- Fabrication of simple structural shapes using Gas Metal ArcWelding
- Joining of plates and pipes using Gas Metal Arc Welding/ Arc Welding /Submerged arcwelding
- Preparation of green sandmoulds

11 Manufacturing of simple sheet metal components using shearing and bending operations.

12. Manufacturing of sheet metal components using metal spinning on alathe

ME8462 MANUFACTURING TECHNOLOGY LABORATORY – II

LIST OF EXPERIMENTS:

Contour milling using vertical millingmachine
Spur gear cutting in millingmachine
Helical Gear Cutting in millingmachine
Gear generation in hobbingmachine
Gear generation in gear shapingmachine
Plain Surfacegrinding
Cylindricalgrinding
Tool angle grinding with tool and CutterGrinder
Measurement of cutting forces in Milling / TurningProcess
CNC PartProgramming

CE8381 STRENGTH OF MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY

STRENGTH OF MATERIALS

LIST OF EXPERIMENTS

Tension test on a mild steelrod
Double shear test on Mild steel and Aluminiumrods
Torsion test on mild steelrod
Impact test on metalspecimen
Hardness test on metals - Brinnell and Rockwell HardnessNumber
Deflection test onbeams
Compression test on helicalsprings
Strain Measurement using Rosette straingauge
Effect of hardening- Improvement in hardness and impact resistance ofsteels.
Tempering- Improvement Mechanical propertiesComparison
Unhardenedspecimen
Quenched Specimen and
Quenched and temperedspecimen.
Microscopic Examinationof
Hardened samplesand
Hardened and temperedsamples.

FLUID MECHANICS ANDMACHINES LABORATORY

LIST OF EXPERIMENTS

Determination of the Coefficient of discharge of given Orificemeter.
Determination of the Coefficient of discharge of given Venturimeter.
Calculation of the rate of flow using Rotameter.
Determination of friction factor for a given set ofpipes.
Conducting experiments and drawing the characteristic curves of centrifugal pump/ submergiblepump
Conducting experiments and drawing the characteristic curves of reciprocatingpump.
Conducting experiments and drawing the characteristic curves of Gearpump.

Conducting experiments and drawing the characteristic curves of Peltonwheel.
Conducting experiments and drawing the characteristics curves of Francisturbine.
Conducting experiments and drawing the characteristic curves of Kaplanturbine.

ME8511 KINEMATICS AND DYNAMICS LABORATORY

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LIST OF EXPERIMENTS

a) Study of gearparameters.
Experimental study of velocity ratios of simple, compound, Epicyclic and differential gear trains.
a)Kinematicsof Four Bar, Slider Crank, Crank Rocker, Double crank, Double rocker, Oscillating cylinderMechanisms.
Kinematics of single and double universaljoints.
a) Determination of Mass moment of inertia of Fly wheel and Axlesystem.
b)Determination of Mass Moment of Inertia of axisymmetric bodies using Turn Table apparatus. c) Determination of Mass Moment of Inertia using bifilar suspension and compoundpendulum.
Motorized gyroscope **–** Study of gyroscopic effect andcouple.
Governor - Determination of range sensitivity, effort etc., for Watts, Porter, Proell, and Hartnell Governors.
Cams **–** Cam profile drawing, Motion curves and study of jumpphenomenon
a) Single degree of freedom Spring Mass System **–** Determination of natural Frequency and verification of Laws of springs **–** Damping coefficient determination. b) Multi degree freedom suspension system **–** Determination of influence coefficient.
a) Determination of torsional natural frequency of single and Double Rotor systems.- Undamped and Damped Naturalfrequencies.
Vibration Absorber **–** Tuned vibrationabsorber.
Vibration of Equivalent Spring mass system **–** undamped and dampedvibration.
Whirling of shafts **–** Determination of critical speeds of shafts with concentratedloads.
a) Balancing of rotating masses. (b) Balancing of reciprocatingmasses.
a) Transverse vibration of Free-Free beam **–** with and without concentrated masses. b) Forced Vibration of Cantilever beam **–** Mode shapes and naturalfrequencies.
c) Determination of transmissibility ratio using vibrating table.

ME8512 THERMAL ENGINEERING LABORATORY

LIST OF EXPERIMENTS

I.C. ENGINE LAB

Valve Timing and Port Timingdiagrams.
Actual p-v diagrams of ICengines.
Performance Test on 4 **–** stroke DieselEngine.
Heat Balance Test on 4 **–** stroke DieselEngine.
Morse Test on Multi-cylinder PetrolEngine.
Retardation Test on a DieselEngine.
Determination of Flash Point and Fire Point of various fuels /lubricants.

STEAM LAB

Study on Steam Generators andTurbines.
Performance and Energy Balance Test on a SteamGenerator.
Performance and Energy Balance Test on SteamTurbine.

HEAT TRANSFER LAB:

Thermal conductivity measurement using guarded plateapparatus.
Thermal conductivity measurement of pipe insulation using lagged pipeapparatus.
Determination of heat transfer coefficient under natural convection from a verticalcylinder.
Determination of heat transfer coefficient under forced convection from atube.
Determination of Thermal conductivity of compositewall.
Determination of Thermal conductivity of insulatingpowder.
Heat transfer from pin-fin apparatus (natural & forced convectionmodes)
Determination of Stefan **–** Boltzmannconstant.
Determination of emissivity of a greysurface.
Effectiveness of Parallel / counter flow heatexchanger.

REFRIGERATION AND AIR CONDITIONING LAB

Determination of COP of a refrigerationsystem
Experiments on Psychrometricprocesses
Performance test on a reciprocating aircompressor
Performance test in a HC RefrigerationSystem
Performance test in a fluidized Bed CoolingTower

ME8513 METROLOGY AND MEASUREMENTS LABORATORY

LIST OF EXPERIMENTS

Calibration and use of measuring instruments **–** Vernier caliper, micrometer, Vernier height gauge **–** using gaugeblocks
Calibration and use of measuring instruments **–** depth micrometer, bore gauge, telescopicgauge
Measurement of linear dimensions usingComparators
Measurement of angles using bevel protractor and sine bar
Measurement of screw thread parameters **–** Screw thread Micrometers and Three wire method **'(floating carriagemicrometer)**
Measurement of gear parameters **–** disc micrometers, gear tooth verniercaliper
Measurement of features in a prismatic component using Coordinate Measuring Machine(CMM)
Programming of CNC Coordinate Measuring Machines for repeated measurements of identical components
Non-**contact (Optical) measurement using Toolmaker's microscope / Profile projector and Video** measurementsystem
Measurement of Surface finish in components manufactured using various processes (turning, milling, grinding, etc.,) using stylus based instruments.
Machine tool metrology **–** Level tests using precision level; Testing of straightness of a machine tool guide way using Autocollimator, spindletests.
Measurement of force, torque andtemperature

ME8681 CAD / CAM LABORATORY

LIST OF EXPERIMENTS

1. 3DGEOMETRICMODELLING

List of Experiments

1. Introduction of 3D Modellingsoftware

Creation of 3D assembly model of following machine elements using 3D Modelling software

FlangeCoupling
Plummer Block
ScrewJack
LatheTailstock
UniversalJoint
MachineVice

Stuffingbox
Crosshead
SafetyValves
Non-returnvalves
Connectingrod
Piston
Crankshaft
Students may also be trained in manual drawing of some of the above components

ManualPartProgramming.

Part Programming - CNC Machining Centre a) LinearCutting.
b) Circular cutting. c) Cutter Radius Compensation. d)Canned CycleOperations.

Part Programming - CNC Turning Centre a) Straight, Taper andRadius Turning.
b) ThreadCutting.
c) Rough and Finish Turning Cycle. d) Drilling andTapping Cycle

3. Computer Aided PartProgramming

CL Data and Post process generation using CAMpackages.
Application of CAPP in Machining and TurningCentre.

ME8711 SIMULATION AND ANALYSIS LABORATORY

LIST OF EXPERIMENTS

SIMULATION

MATLAB basics, Dealing with matrices, Graphing-Functions of one variable and twovariables
Use of Matlabto solve simple problems invibration
Mechanism Simulation using Multibody Dynamicsoftware

ANALYSIS

Force and Stress analysis using link elements in Trusses, cablesetc.
Stress and deflection analysis in beams with different supportconditions.
Stress analysis of flat plates and simpleshells.
Stress analysis of axi **–** symmetriccomponents.
Thermal stress and heat transfer analysis of plates.
Thermal stress analysis of cylindricalshells.
Vibration analysis of spring-masssystems.
Model analysis ofBeams.
Harmonic, transient and spectrum analysis of simple systems.
10.

ME8781 MECHATRONICS LABORATORY

LIST OF EXPERIMENTS:

1. Assembly language programming of 8085 **–** Addition **–** Subtraction **–** Multiplication **–** Division **–** Sorting **–** CodeConversion.

Stepper motorinterface.
Traffic lightinterface.
Speed control of DCmotor.
Study of various types oftransducers.
Study of hydraulic, pneumatic and electro-pneumaticcircuits.
Modelling and analysis of basic hydraulic, pneumatic and electrical circuits usingSoftware.
Study of PLC and itsapplications.
Study of image processingtechnique.

B.E. AUTOMOBILE ENGINEERING

GE3171 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C

0 0 4 2

OBJECTIVES:

- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To practice various computing strategies for Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

EXPERIMENTS:

Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation)
11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc. **TOTAL: 60 PERIODS**

OUTCOMES:

On completion of the course, students will be able to:
CO1: Develop algorithmic solutions to simple computational problems
CO2: Develop and execute simple Python programs.
CO3: Implement programs in Python using conditionals and loops for solving problems.. CO4: Deploy functions to decompose a Python program.
CO5: Process compound data using Python data structures.
CO6: Utilize Python packages in developing software applications.

TEXT BOOKS:

1. Allen B. Downey, "Think Python : How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data‘‘, Third Edition, MIT Press, 2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

BS3171	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	C
		0	0	4	2

PHYSICS LABORATORY : (Any Seven Experiments)

OBJECTIVES:

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.

- To make the student as an active participant in each part of all lab exercises.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wave length of the laser using grating
6. Air wedge - Determination of thickness of a thin sheet/wire
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamics kit.

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of the course, the students should be able to

- Understand the functioning of various physics laboratory equipment.
- Use graphical models to analyze laboratory data.
- Use mathematical models as a medium for quantitative reasoning and describing physical reality.
- Access, process and analyze scientific information.
- Solve problems individually and collaboratively.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in water sample.
   - Split the first experiment into two
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.

9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.
12. Estimation of sodium /potassium present in water using flame photometer.
13. Preparation of nanoparticles (TiO_2/ZnO/CuO) by Sol-Gel method.
14. Estimation of Nickel in steel
15. Proximate analysis of Coal

TOTAL : 30 PERIODS

OUT COMES :

- To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
- To determine the amount of metal ions through volumetric and spectroscopic techniques
- To analyse and determine the composition of alloys.
- To learn simple method of synthesis of nanoparticles
- To quantitatively analyse the impurities in solution by electroanalytical techniques

TEXT BOOKS :

1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (2009).

GE3271 ENGINEERING PRACTICES LABORATORY L T P C

0 0 4 2

OBJECTIVES:

The main learning objective of this course is to provide hands on training to the students in:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in commonhousehold wood work.
2. Wiring various electrical joints in common household electrical wire work.
3. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
4. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES 15

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers,elbows and other components which are commonly used in household.
b) Preparing plumbing line sketches.
c) Laying pipe connection to the suction side of a pump d) Laying pipe connection to the delivery side of a pump.
e) Connecting pipes of different materials: Metal, plastic and flexible pipes used inhousehold appliances.

WOOD WORK:

a) Sawing,
b) Planing and
c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint. Wood Work Study:
a) Studying joints in door panels and wooden furniture
b) Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES 15

a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
b) Staircase wiring
c) Fluorescent Lamp wiring with introduction to CFL and LED types. d) Energy meter wiring and related calculations/ calibration
e) Study of Iron Box wiring and assembly
f) Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)
g) Study of emergency lamp wiring/Water heater

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
b) Practicing gas welding.

BASIC MACHINING WORK:

a) (simple)Turning.
b) (simple)Drilling.
c) (simple)Tapping.

ASSEMBLY WORK:

a) Assembling a centrifugal pump.
b) Assembling a household mixer.
c) Assembling an airconditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES 15

SOLDERING WORK:

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

a) Study an elements of smart phone..
b) Assembly and dismantle of LED TV.
c) Assembly and dismantle of computer/ laptop

TOTAL : 60 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to:

1. Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
2. Wire various electrical joints in common household electrical wire work.
3. Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
4. Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

BE3271 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

L T P C
0 0 4 2

COURSE OBJECTIVES:

- To train the students in conducting load tests on electrical machines
- To gain practical experience in characterizing electronic devices
- To train the students to use DSO for measurements.

LIST OF EXPERIMENTS

1. Verification of ohms and Kirchhoff's Laws.
2. Load test on DC Shunt Motor.
3. Load test on Self Excited DC Generator
4. Load test on Single phase Transformer
5. Load Test on Induction Motor
6. Characteristics of PN and Zener Diodes
7. Characteristics of BJT, SCR and MOSFET
8. Half wave and Full Wave rectifiers
9. Study of Logic Gates
10. Implementation of Binary Adder and Subtractor
11. Study of DSO

TOTAL: 60 PERIODS

COURSE OUTCOMES:

After completing this course, the students will be able to

1. Use experimental methods to verify the Ohm's and Kirchhoff's Laws.
2. Analyze experimentally the load characteristics of electrical machines
3. Analyze the characteristics of basic electronic devices
4. Use DSO to measure the various parameters

SEMESTER I

GE8161 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY

LIST OF PROGRAMS

Compute the GCD of two numbers.
Find the square root of a number (Newton's method)

Exponentiation (power of a number)
Find the maximum of a list of numbers
Linear search and Binary search
Selection sort, Insertion sort
Merge sort
First n prime numbers
Multiply matrices
Programs that take command line arguments (word count)
Find the most frequent words in a text read from a file
Simulate elliptical orbits in Pygame
Simulate bouncing ball using Pygame

BS8161 PHYSICS AND CHEMISTRY LABORATORY

(Common to all branches of B.E. / B.Tech Programmes)

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

Determination of rigidity modulus – Torsion pendulum
Determination of Young's modulus by non-uniform bending method
(a) Determination of wavelength, and particle size using Laser
(b) Determination of acceptance angle in an optical fiber.
Determination of thermal conductivity of a bad conductor – Lee's Disc method.
Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
Determination of wavelength of mercury spectrum – spectrometer grating
Determination of band gap of a semiconductor
Determination of thickness of a thin wire – Air wedge method

LIST OF EXPERIMENTS: CHEMISTRY LABORATORY (Any seven experiments to be conducted)

1.Estimation of HCl using Na2CO3 as primary standard and Determination of alkalinity in water sample.
Determination of total, temporary & permanent hardness of water by EDTA method.
Determination of DO content of water sample by Winkler's method.
Determination of chloride content of water sample by argentometric method.
Estimation of copper content of the given solution by Iodometry.
Determination of strength of given hydrochloric acid using pH meter.
Determination of strength of acids in a mixture of acids using conductivity meter.
Estimation of iron content of the given solution using potentiometer.
Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).
Estimation of sodium and potassium present in water using flame photometer.
Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

Pseudo first order kinetics-ester hydrolysis.
Corrosion experiment-weight loss method.
Determination of CMC.
Phase change in a solid.
Conductometric titration of strong acid vs strong base.

SEMESTER II

GE8261 ENGINEERING PRACTICES LABORATORY

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE Buildings:

Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

Study of pipe connections requirements for pumps and turbines.

Preparation of plumbing line sketches for water supply and sewage works.

Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

Demonstration of plumbing requirements of high-rise buildings. Carpentry using Power Tools only:

Study of the joints in roofs, doors, windows and furniture.

Hands-on-exercise:

Wood work, joints by sawing, planing and cutting.

MECHANICAL ENGINEERING PRACTICE

Welding:

(a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.

(b) Gas welding practice

Basic Machining:

(a) Simple Turning and Taper turning

(b) Drilling Practice

Sheet Metal Work:

(a) Forming & Bending:

(b) Model making – Trays and funnels.

(c) Different type of joints.

Machine assembly practice:

(a) Study of centrifugal pump

(b) Study of air conditioner

Demonstration on:

(a) Smithy operations, upsetting, swaging, setting down and bending. Example –Exercise – Production of hexagonal headed bolt.

(b) Foundry operations like mould preparation for gear and step cone pulley.

(c) Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 13

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.

Fluorescent lamp wiring.
Stair case wiring
Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
Measurement of energy using single phase energy meter.
Measurement of resistance to earth of electrical equipment.

Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
Study of logic gates AND, OR, EX-OR and NOT.
Generation of Clock Signal.
Soldering practice – Components Devices and Circuits – Using general purpose PCB.
Measurement of ripple factor of HWR and FWR.

BE8261 BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY

LIST OF EXPERIMENTS:
Load test on separately excited DC generator
Load test on Single phase Transformer
Load test on Induction motor
Verification of Circuit Laws
Verification of Circuit Theorems
Measurement of three phase power
Load test on DC shunt motor.
Diode based application circuits
Transistor based application circuits
Study of CRO and measurement of AC signals
Characteristics of LVDT
Calibration of Rotometer
RTD and Thermistor

SEMESTER III

CE8381 STRENGTH OF MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY

STRENGTH OF MATERIALS

LIST OF EXPERIMENTS
Tension test on a mild steel rod
Double shear test on Mild steel and Aluminium rods
Torsion test on mild steel rod
Impact test on metal specimen
Hardness test on metals - Brinnell and Rockwell Hardness Number
Deflection test on beams
Compression test on helical springs
Strain Measurement using Rosette strain gauge
Effect of hardening- Improvement in hardness and impact resistance of steels.
Tempering- Improvement Mechanical properties Comparison
Unhardened specimen
Quenched Specimen and

Quenched and tempered specimen.

11. Microscopic Examination of
Hardened samples and
Hardened and tempered samples.

FLUID MECHANICS AND MACHINES

LABORATORY LIST OF EXPERIMENTS

Determination of the Coefficient of discharge of given Orifice meter.
Determination of the Coefficient of discharge of given Venturi meter.
Calculation of the rate of flow using Rota meter.
Determination of friction factor for a given set of pipes.
Conducting experiments and drawing the characteristic curves of centrifugal pump/ submergible pump
Conducting experiments and drawing the characteristic curves of reciprocating pump.
Conducting experiments and drawing the characteristic curves of Gear pump.
Conducting experiments and drawing the characteristic curves of Pelton wheel.
Conducting experiments and drawing the characteristics curves of Francis turbine.
Conducting experiments and drawing the characteristic curves of Kaplan turbine.

ME8381 COMPUTER AIDED MACHINE DRAWING

UNIT I DRAWING STANDARDS & FITS AND TOLERANCES

Code of practice for Engineering Drawing, BIS specifications – Welding symbols, riveted joints, keys, fasteners – Reference to hand book for the selection of standard components like bolts, nuts, screws, keys etc. - Limits, Fits – Tolerancing of individual dimensions – Specification of Fits – Preparation of production drawings and reading of part and assembly drawings, basic principles of geometric dimensioning & tolerancing.

UNIT II INTRODUCTION TO 2D DRAFTING

Drawing, Editing, Dimensioning, Layering, Hatching, Block, Array, Detailing, Detailed drawing.
Bearings - Bush bearing, Plummer block
Valves – Safety and non-return valves.

UNIT III 3D GEOMETRIC MODELING AND ASSEMBLY

Sketcher - Datum planes – Protrusion – Holes - Part modeling – Extrusion – Revolve – Sweep – Loft – Blend – Fillet - Pattern – Chamfer - Round - Mirror – Section - Assembly
Couplings – Flange, Universal, Oldham's, Muff, Gear couplings
Joints – Knuckle, Gib & cotter, strap, sleeve & cotter joints
Engine parts – Piston, connecting rod, cross-head (vertical and horizontal), stuffing box, multi-plate clutch
Miscellaneous machine components – Screw jack, machine vice, tail stock, chuck, vane and gear pump

HS8381 INTERPERSONAL SKILLS/LISTENING & SPEAKING

UNIT I

Listening as a key skill- its importance- speaking - give personal information - ask for personal information - express ability - enquire about ability - ask for clarification Improving pronunciation - pronunciation basics taking lecture notes - preparing to listen to a lecture - articulate a complete idea as opposed to producing fragmented utterances.

UNIT II

Listen to a process information- give information, as part of a simple explanation - conversation starters: small talk - stressing syllables and speaking clearly - intonation patterns - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

UNIT III

Lexical chunking for accuracy and fluency - factors influence fluency, deliver a five-minute informal talk - greet - respond to greetings - describe health and symptoms - invite and offer - accept - decline - take leave - listen for and follow the gist- listen for detail

UNIT IV

Being an active listener: giving verbal and non-verbal feedback - participating in a group discussion - summarizing academic readings and lectures conversational speech listening to and participating in conversations - persuade.

SEMESTER IV

AT8411 AUTOMOTIVE COMPONENTS LABORATORY

LIST OF EXPERIMENTS

- **Dismantling and study of Multi-cylinder Petrol Engine**
- **Assembling of Multi-cylinder Petrol Engine**
- **Dismantling and study of Multi-cylinder Diesel Engine**
- **Assembling of Multi-cylinder Diesel Engine**
- **Study of petrol engine fuel system**
- **Study of diesel engine fuel system**
- **Study and measurement of light and heavy commercial Vehicle Frame**
- **Study, dismantling and assembling of front and rear Axles**
- **Study, dismantling and assembling of differential**
- **Study, dismantling and assembling of Clutch**
- **Study, dismantling and assembling of Gear Box**
- **Study of steering system**

EC8382 ELECTRONICS AND MICROPROCESSORS LABORATORY

LIST OF EXPERIMENTS

ELECTRONICS

- **VI Characteristics of PN Junction Diode**
- **VI Characteristics of Zener Diode**
- **Characteristics of CE Transistor**
- **Characteristics of JFET**
- **Characteristics of Uni Junction Transistor**
- **RC or Wein Bridge Oscillator**
- **Study of Logic Gates (Basic Gates)**
- **Half Adder and Full Adder**
- **Shift Registers and Counters**
- **Operational Amplifier (Adder, Subtractor, Differentiator, Integrator, Inverting and Non – Inverting**

MICROPROCESSORS

- **Block Transfer**
- **8 bit Addition, Subtraction**
- **Multiplication and Division**
- **Maximum and Minimum of block of data**
- **Sorting**
- **Stepper Motor Interfacing**

SEMESTER V

AT8511 AUTOMOTIVE ELECTRICAL AND ELECTRONICS LABORATORY

LIST OF EXPERIMENTS

a. Electrical Laboratory

- Testing of batteries and battery maintenance
- Testing of starting motors and generators
- Testing of regulators and cut – outs
- Diagnosis of ignition system faults
- Study of Automobile electrical wiring

b. Electronics Laboratory

- Study of rectifiers and filters
- Study of logic gates, adder and flip-flops
- Study of SCR and IC timer
- Interfacing Sensors like RTD, LVDT, Load Cell etc.
- Interfacing ADC for Data Acquisition
- Interfacing DAC for Control Application
- Interfacing A/D converter and simple data acquisition
- Micro controller programming and interfacing
- Interfacing Actuators
- EPROM Programming
- Fault Diagnosis of various sensors

AT8512 AUTOMOTIVE FUELS AND LUBRICANTS LABORATORY

LIST OF EXPERIMENTS

- Study of International and National standards for fuels and lubricants.
- Study of Octane and Cetane Number of fuels.
- ASTM distillation test of liquid fuels
- Aniline Point test of diesel
- Calorific value of liquid fuel.
- Calorific value of gaseous fuel.
- Reid vapour pressure test.
- Flash and Fire points of petrol and diesel.
- Copper strip Corrosion Test
- Cloud & Pour point Test.
- Temperature dependence of viscosity of lubricants & Fuels by Redwood Viscometer.
- Viscosity Index of lubricants & Fuels by Saybolt Viscometer
- Ash content and Carbon Residue Test
- Drop point of grease and mechanical penetration in grease.

HS8581 PROFESSIONAL COMMUNICATION

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills— Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview - one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress-networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes

SEMESTER VI

AT8611 COMPUTER AIDED ENGINE AND CHASSIS DESIGN LABORATORY

LIST OF ENGINE DESIGN EXPERIMENTS

Design and drawing of piston, piston pin and piston rings and drawing of these components.

Design of connecting rod small end and big end, shank design, design of big end cap, bolts and drawing of the connecting rod assembly.

Design of crankshaft, balancing weight calculations.

Development of short and long crank arms, front end and rear end details, drawing of the crankshaft assembly.

Design and drawing of flywheel.

Ring gear design, drawing of the flywheel including the development of ring gear teeth.

Design and drawing of the inlet and exhaust valves.

Design of cam and camshaft, cam profile generation, drawing of cam and camshaft.

Design of combustion chamber.

LIST OF CHASSIS DESIGN EXPERIMENTS

CLUTCH

Complete design of clutch components.

Assembly drawing of clutch using drafting software.

GEAR BOX

Gear train calculations.

Layout of gear box.

Calculation of bearing loads

Selection of bearings.

Assembly drawing of gear box using drafting software.

DRIVE LINE AND REAR AXLE

Design of propeller shaft.

Design details of final drive gearing.

Design details of full floating, semi-floating and three quarter floating rear shafts and rear axle housings

Design aspects of final drive.

AT8612 TWO AND THREE WHEELERS LABORATORY

LIST OF EXPERIMENTS

Performance test of a two wheeler using chassis dynamometer.
Performance test on shock absorber
Performance test on coil spring.
Two wheeler chain test
Brake and Clutch adjustment as per specification.
Dismantling and assembling of two wheeler gear box and finding gear ratios
Dismantling and assembling of three wheeler box and finding gear ratios
Three wheeler brake and clutch play adjustment
Dismantling and assembling of three wheeler steering system.
Study of three wheeler chassis frame and power transmission system.

SEMESTER VII

AT8711 ENGINE PERFORMANCE AND EMISSION TESTING LABORATORY

LIST OF EXPERIMENTS

Study of hydraulic, electrical and eddy current dynamometers
Valve timing and port timing diagrams
Performance and emission test on two wheeler SI engine
Performance and emission test on automotive multi-cylinder SI engine
Performance and emission test on automotive multi-cylinder CI engine
Retardation test on I.C. Engines.
Heat balance test on automotive multi-cylinder SI engine
Heat balance test on automotive multi-cylinder CI engine
Morse test on multi-cylinder SI engine
Engine cylinder pressure measurement P-θ and P-V diagrams for IC engine with piezo-electric pick up, charge amplifier, angle encoder and data acquisition system.
Motoring test for indicated power

AT8712 VEHICLE MAINTENANCE LABORATORY

STUDY EXPERIMENTS:

Tools and instruments required for maintenance
Safety aspects with respect to man, machine and tools
General procedures for servicing and maintenance schedule
Wheel Alignment procedure

Minor and major tune up of gasoline and diesel engines
Calibration of Fuel pump
Engine fault diagnosis using scan tool
Fault diagnosis and service of transmission system
Fault diagnosis and service of driveline system
Fault diagnosis and service of braking system
Fault diagnosis and service of suspension system
Fault diagnosis and service of steering system
Fault diagnosis and service of Electrical system like battery, starting system, charging system, lighting system etc
Fault diagnosis and service of vehicle air conditioning system
Practice the following:
i. Adjustment of pedal play in clutch, brake, hand brake lever and steering wheel play.

Air bleeding from hydraulic brakes, air bleeding of diesel fuel system.

Wheel bearings tightening and adjustment.

Adjustment of head lights beam.

Removal and fitting of tire and tube.

TAMILNADU COLLEGE OF ENGINEERING

KARUMATHAMPATTI: COIMBATORE: 641659

DEPARTMENT OF CIVIL ENGINEERING

LIST OF LAB EQUIPMENTS

ADVANCED STRUCTURAL LAB

S.NO	NAME OF THE EQUIPMENTS	QUANTITY AVILABLE IN NOS	COST	DATE OF PURCHASE	INVOICE NO.
1	Vibration Indicator	1	52,000.00	24.01.2005	47
2	Data logger	1	60,000.00	24.01.2005	47
3	Vibration Exciter	1	148000.00	24.01.2005	1D/2004-2005/047
4	FFT Analyser	1	125500.00	27.10.2015	009
5	Loading Frame (including push pull jack 50 ton capacity & power pack with presure gauge)	1	350000.00	27.10.2015	009
6	Ultrasonic Pulse Velocity	1	2,60,000.00	18.6.2015	15/15-16

GEOTECHNICAL LAB

S.NO	NAME OF THE EQUIPMENTS	QUANTITY AVILABLE IN NOS	COST	DATE OF PURCHASE	INVOICE NO.
1	Triaxial Test	1	1,50,000.00	4.07.2003	127
2	Consolidation Apparatus	1	91,125.00	2.02.2007	59

STRENGTH OF MATERIALS LAB

S.NO	NAME OF THE EQUIPMENTS	QUANTITY AVILABLE IN NOS	COST	DATE OF PURCHASE	INVOICE NO.
1	Universal Testing Machine(40 T)	1	1,36,470	21.01.1990	520
2	Universal Testing Machine(100 T)	1	7,24,477	31.12.2003	1040

CONCRETE & HIGHWAY LAB

S.NO	NAME OF THE EQUIPMENTS	QUANTITY AVILABLE IN NOS	COST	DATE OF PURCHASE	INVOICE NO.

S.NO	NAME OF THE EQUIPMENTS	QUANTITY AVILABLE IN NOS	COST	DATE OF PURCHASE	INVOICE NO.
1	Centrifugue Extractor	1	60,857	21.08.2013	52

HYDRAULIC ENGINEERING LAB

S.NO	NAME OF THE EQUIPMENTS	QUANTITY AVILABLE IN NOS	COST	DATE OF PURCHASE	INVOICE NO.
1	Pelton wheel turbine	1	78,000.00	27.04.1989	2861
2	Francis turbine	1	71,000.00	27.04.1989	2860
3	Submersible pump	1	60,000.00	21.10.2003	27
4	Turgo Impulse Wheel Turbine	1	1,14,000.00	21.10.2003	27
5	Kaplan turbine	1	2,00,020.00	18.02.2014	26

ENVIROINMENTAL ENGINEERING LAB

S.NO	NAME OF THE EQUIPMENTS	QUANTITY AVILABLE IN NOS	COST	DATE OF PURCHASE	INVOICE NO.
1	Water quality analyzer	1	53500	21.11.2006	5049
2	UV/Visible Spectrophotometer	1	110600	01.12.2006	5051
3	COD Analyzer	1	76572	19.4.2017	32
4	COD Digestor	1	62947.11	19.4.2017	32
5	BOD Analyzer	1	69600	19.4.2017	32

SURVEY LAB

S.NO	NAME OF THE EQUIPMENTS	QUANTITY AVILABLE IN NOS	COST	DATE OF PURCHASE	INVOICE NO.
1	Advanced Total station & LISCADD Software	1	4,62,000.00	19.08.2003	NA/195

TAMILNADU COLLEGE OF ENGINEERING KARUMATHAMPATTI:
COIMBATORE: 641659 DEPARTMENT OF CIVIL ENGINEERING

NAME OF THE LABORATORY	TOTAL COST (Rs.)
SURVEY	833269
GEOTECHNICAL ENGINEERING	339605
HYDRAULIC ENGINEERING	897755
COMPUTER	2954260
STRENGTH OF MATERIALS	1131885
ENVIRONMENTAL ENGINEERING	894708
CONCRETE & HIGHWAY	358779
STRUCTURAL ENGINEERING	1154600
TOTAL COST (Rs.)	85,64,861.00

TAMILNADU COLLEGE OF ENGINEERING KARUMATHAMPATTI:
COIMBATORE: 641659 DEPARTMENT OF CIVIL ENGINEERING

SI NO.	LAB FURNITURE	NUMBERS	COST IN Rs
1	Staff Table	17	42500
2	S type chair	12	6000
3	Square type chair	8	3200
4	Working table (4x4)	21	105000
5	Steel stool	43	21500
6	Almirah	23	115000
7	Steel desk	128	128000
8	L type chair	7	3500
9	Steel chair	3	1500
10	Wooden staff table	10	50000
11	System table	41	82000
12	Chairs	41	41000
TOTAL COST (Rs)			599200

16. Enrollment of students in the last 3 years

S.No	Degree	Course	Year Started	Type of Affiliation	2021-22		2020-21		2019-20	
					Intake	Admitted	Intake	Admitted	Intake	Admitted
1	B.E.	Civil Engineering	1984	Permanent	30	14	30	4	60	3
2	B.E.	Mechanical Engineering	1984	Permanent	60	20	60	9	90	6
3	B.E.	Instrumentation and Control Engineering	1984	Permanent	30	20	30	11	60	4
4	B.E.	Computer Science and Engineering	1988	Permanent	60	55	60	49	60	13
5	B.E.	Electronics and Communication Engineering	1988	Permanent	60	45	60	18	60	9
7	B.E.	Electrical and Electronics Engineering	2006	Provisional	30	19	30	4	60	5
8	B.E.	Automobile Engineering	2006	Provisional	30	8	30	3	60	6
9	M.E.	Computer Science and Engineering	2005	Permanent	18	4	18	1	18	-
10	M.E.	Structural Engineering	2005	Provisional	18	12	18	4	18	4
11	MBA	Management studies	1994	Permanent	30	9	30	10	60	4

16.Placement facilities / campus placement for last 3 years:

S. No.	Name of the Program	Details	2019-20	2020-21	2021-22
	B.E. Automobile Engineering	No. of students Placed	5	6	10
		Minimum Salary (Lakhs per annum)	1.2	1.2	1.2
		Maximum Salary (Lakhs per annum)	2	2	2
		Average Salary (Lakhs per annum)	1.6	1.6	1.6
2.	B.E. Civil Engineering	No. of students Placed	2	4	12
		Minimum Salary (Lakhs per annum)	1.2	1.2	1.2
		Maximum Salary (Lakhs per annum)	2	2	2
		Average Salary (Lakhs per annum)	1.6	1.6	1.6
3	B.E. Computer Science and Engineering	No. of students Placed	13	8	22
		Minimum Salary (Lakhs per annum)	1.2	1.2	1.2
		Maximum Salary (Lakhs per annum)	10	10	3.5
		Average Salary (Lakhs per annum)	3.5	3	2

4	B.E. Electronics and Communication Engineering	No. of students Placed	26	23	20
		Minimum Salary (Lakhs per annum)	1.0	1.0	1.2
		Maximum Salary (Lakhs per annum)	1.2	1.2	3.5
		Average Salary (Lakhs per annum)	1.1	1.1	2
5	B.E. Electrical and Electronics Engineering	No. of students Placed	13	8	5
		Minimum Salary (Lakhs per annum)	1.2	1.2	1.2
		Maximum Salary (Lakhs per annum)	1.0	1.0	2
		Average Salary (Lakhs per annum)	1.1	1.1	1.6
6	B.E. Instrumentation and Control Engineering	No. of students Placed	-	1	3
		Minimum Salary (Lakhs per annum)	-	1.2	1.2
		Maximum Salary (Lakhs per annum)	-	1.2	2
		Average Salary (Lakhs per annum)	-	1.2	1.5
7	B.E. Mechanical Engineering	No. of students Placed	11	21	20
		Minimum Salary (Lakhs per annum)	1.2	1.2	1.2
		Maximum Salary (Lakhs per annum)	2	2	2
		Average Salary (Lakhs per annum)	1.5	1.5	1.6

17. Details of Grant received:

S.No.	Year	Scheme Name	Amount Received in Rupees
1	2019-2020	LECTURE SERIES – MHRD-IIC	12,000
2	2018-2019	PMKVY-TI	66,80,500
3	2018-2019	UNNAT BHARAT ABHIYAN	50,000
4	2018-2019	TNSCST- PUBLICATION IN TAMIL	20,000
5	2017-2018	PRERANA	10,00,000
6	2017-2018	PMKVY-TI	9,88,625

Details of MOU:

S.NO.	YEAR	NAME OF THE ORGANISTION
1	2021-22	Evoriea infotech pvt ltd,bangalore
2	2021	Splendio technologies,chennai
3	2021	True friend management support services pvt ltd,chennai
4	2021	Innovalley works private limited,coimbatore
5	2021	Neolysi technologies, Chennai

Details of Consultancy Services:

S.NO.	YEAR	NAME OF THE COMPANY	NATURE OF CONSULTANCY	AMOUNT GENERATED (in Rs.)
1.	2019-2020	M/S SUBRAMANIAM CONSTRUCTIONS	TESTING OF CONCRETE CUBES, STEEL AND DESIGN SOLUTIONS	1,12,000
		M/S LOGANATHAN CONSTRUCTION		
		M/S GLOBAL DESIGNER TILES		
		M/S DEVARAJ CONSTRUCTIONS		
2.	2020-2021	THULASI BUILDERS, SOMANUR	TESTING OF CONCRETE CUBES, STEEL AND DESIGN SOLUTIONS	52000
		GANESAA REMIX CONCRETE,KARAMPETTAI		
		SWAMI ENGINEERING CONSTRUCTION,THEKKALUR		
3.	2021-2022	. AADHI LAKSHMI SPINNING MILLS,PALLADAM	TESTING OF CONCRETE CUBES, STEEL AND DESIGN SOLUTIONS	35000
		JP**G** CONSTRUCTION ,AVINASHI		

18. LoA and subsequent EoA till the academic year

अखिल भारतीय
तकनीकी शिक्षा परिषद्
(भारत सरकार का एक विधिक संस्थान)
डी-47,नई दिल्ली साउथ एक्सटेन्शन, भाग-I, नई दिल्ली-110049.
दूरभाष : 4629908, 4620637, 4620643, 4620815

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(A STATUTORY BODY OF THE GOVERNMENT OF INDIA)
D-47, N.D.S.E., PART-I NEW DELHI-110049
PHONE : 4629908, 4620637, 4620643, 4620815

F.No.45-29/90-AICTE/9184

June 29, 1992

Regd. Post

To,

The Secretary,
Technical Education,
Government of Tamil Nadu,
Fort.St. George,
Madras-600 006.

SUB:-AICTE APPROVAL TO TAMIL NADU COLLEGE OF ENGINEERING, COIMBATORE, TAMIL NADU.

Sir,

I am directed to state that on the basis of the recommendation of the Southern Regional Committee of the AICTE, the All India Council for Technical Education has given approval to the Tamil Nadu College of Engineering, Coimbatore for conducting the following four year Degree Courses with the annual intakes indicated against each during the academic year 1992-93 only.

COURSES	INTAKES
Civil Engineering	30 (Thirty)
Mechanical Engineering	60 (Sixty)
Instrumentation & Control Engineering	30 (Thirty)
Electronics & Communication Engineering	30 (Thirty)
Computer Science & Engineering	30 (Thirty)

The above approval is subject to fulfilment of the following conditions:

1. The Metrology laboratory should be expanded and equipped with adequate machinery as per the AICTE norms by the end of December 1992.

2. The Fitting and Foundary Shops should be established separately with adequate equipment and proper vantilation by the end of December, 1992.

3. Steam Engine and Boiler should be provided for Heat Power Laboratory by the end of December 1992.

4. Subscription should be made for a total of 24 journals (12 national and 12 international) for each subject as per the AICTE norms immediately.

29.6.92

29/6/92

5. The faculty should be in position by the end of December 1992 with a strength of 10 Professors, 20 Asst. Professors and 42 Lecturers and the faculty should be paid AICTE pay scales.

6. The annual recurring expenditure should be brought up to the level of Rs.85 lakhs by the end of the financial year 1992-93.

7. The Institution should not start any new course without prior approval of the AICTE.

8. The Institution should not alter the approved intake for any course under any circumstances without prior approval of the AICTE.

9. The management including the Governing Council should be constituted and the Chairman of the Council should be appointed as per the guidelines of the AICTE.

10. The admissions should be made as per the norms and guidelines of the AICTE as adopted by the State Govt. of Tamil Nadu.

11. The admissions should be made only after the minimum requisite facilities are created and the affiliating University has given permission to start the course.

12. The tuition and other fees should be charged as per the rules prescribed by the State Govt. within the overall criteria prescribed by the AICTE from time to time. No capitation fees should be charged from the students/ guardian of the students in any form.

13. The accounts of the Institution should be audited annually by a Charted Accountant and will be open for inspection by AICTE or anybody authorised by it.

14. The teaching and other staff should be selected according to procedure, qualification and experience prescribed by the AICTE from time to time.

15. The management should strictly follow any further conditions as may be laid down by the AICTE from time to time.

An Expert Committee of the Southern Regional Committee of the AICTE will visit the Tamil Nadu College of Engineering by the end of academic year 1992-93 to verify the fulfilment of conditions prescribed by the AICTE and to recommend continuation of AICTE approval or otherwise.

29/6/92

29.6.92

In the event of non-compliance by the Tamil Nadu College of Engineering with regard to guidelines, norms and standards as prescribed by the AICTE from time to time, the AICTE or anybody authorised by it will be free to take measures for withdrawl of its approval or recognition without consideration of any related issues and that all liabilities arising out of such a withdrawl would solely be that of the Tamil Nadu College of Engineering.

You are requested to take appropriate action to implement the decision of the AICTE and communicate the progress made in this regard to the Southern Regional Committee of the AICTE under intimation to this office.

Yours faithfully,

29/6/92

(B.L. RAMA)
UNDER SECRETARY(T)

29.6.92

(S.A.A. ALVI)
ADDITIONAL SECRETARY(T)

Copy for information and necessary action to :

1. The Regional Officer, Ministry of Human Resource Development, Department of Education, Southern Regional Office, 26, Haddows Road, Madras-600 006.

   a) The visit of a Team to the Institute should be arranged before 31-3-93 and the Southern Regional Committee and the AICTE be kept informed about the fulfillment of the conditions as stipulated.

   b) The recommendations of the Expert Committee should be made available to the Management of The College with instructions that the College should carry out implementation of the recommendations.

2. The Director of Technical Education,Government of Tamil Nad, Guindy, Madras-600 025.

3. The Chairman, Tamilnadu College of Engineering, Coimbatore-638 659.

4. The Deputy Adviser (E), Planning Commission, Yojna Bhavan, Parliament Street, New Delhi 110 001.

5. Shri S.D. Awale, JEA(T), Department of Education, 'C' Wing, Shastri Bhavan, New Delhi 110 001.

6. The Registrar, Bharathiar University, Coimbatore-641 046.

7. The Director, Board of Apprenticeship Training (Southern Region), CIT Campus,Taramani, Madras 600 013.

8. The Principal, TTTI, Taramani, Madras 600 113.

9. The Programme Director, ISTE, IIT Campus, Hauz Khas, New Delhi 110 016.

10. TD.1 (Survey Unit), Department of Education, 'C' Wing, Shastri Bhavan, Dr. Rajendra Prasad Marg, New Delhi.

11. Survey Unit (AICTE).

12. Guard file for sanction (AICTE).

29/6/92

(B.L. RAMA)
Under Secretary (T)

अखिल भारतीय
तकनीकी शिक्षा परिषद्
(भारत सरकार का एक विधिक संस्थान)

ALL INDIA COUNCIL FOR
TECHNICAL EDUCATION
(A STATUTORY BODY OF THE GOVERNMENT OF INDIA)

फोन : 4629908, 4620637, 4620643, 4620815
PHONE : 4629908, 4620637, 4620643, 4620815

F.No. 48-29/90-AICTE

December 28, 1992

To,

REGD.A/D

The Secretary
Education Department,
Government of Tamil Nadu
Fort St. George
Madras-600 009

Sub: AICTE approval for increase in intake in the existing Engineering Degree courses in Tamil Nadu College of Engineering, Coimbatore

Sir,

Further to this Council's letter of even number dated 29-6-1992, I am to state that, based on the recommendations of the Southern Regional Committee's Expert Committee which visited the College on 16-11-1992, the All India Council for Technical Education (AICTE) has granted approval to the Tamil Nadu College of Engineering, Coimbatore, Tamil Nadu for increase in intake from 30 (thirty) to 60 (Sixty) in each of the following approved 4-year degree courses, increasing the total annual intake from 180 (one hundred & eighty) to 270 (two hundred & seventy) during the academic year 1992-93 only:-

Course	Existing Intake	Increased Intake
1) Instrumentation & Control Engineering	30 (Thirty)	60 (Sixty)
2) Electronics & Communication Engineering	30 (Thirty)	60 (Sixty)
3) Computer Science & Engineering	30 (Thirty)	60 (Sixty)

The above approval is subject to fulfilment of the following conditions:-

1) The conditions as laid down in the Council's letter of even number, dated 29-6-1992 will remain unchanged.

2) The College must provide multiuser environment by installing a mini computer and connecting atleast 32 terminals with Unix or equivalent system and a 600 lpm printer by the end

3) Laboratory work space, work tables and equipment should be increased by June 1993 to the required extent in a phased manner.

4) The College should procure more equipments for Microwave Laboratory and more measuring instruments such as digital meters etc and atleast 10 more oscilloscopes, 4 signal generators etc. The Communication Laboratory should be strengthened before June 1993.

28.12.92

29.12.92.

अखिल भारतीय
तकनीकी शिक्षा परिषद्
(भारत सरकार का एक विधिक संस्थान्)
इंदिरा गांधी खेल परिसर, आई॰ पी॰ एस्टेट
नई दिल्ली - 110 002
दूरभाष : 3351747 / 48 / 49, 3326681
फैक्स : 011-3351751

ALL INDIA COUNCIL FOR
TECHNICAL EDUCATION
(A STATUTORY BODY OF THE GOVERNMENT OF INDIA)
Indira Gandhi Sports Complex, I.P. Estate
New Delhi-110 002
Phone : 3351747 / 48 / 49, 3326681
FAX: 011-3351751

F.No.2-15/BIII/RC(M)/93

April 17, 1994

To,

Regd. A/D.

The Secretary,
Education Department,
Government of Tamil Nadu,
Fort St. George,
Madras-600 009.

Sub: AICTE approval to the Tamilnadu College of Engineering, Karumathampatti, Coimbatore-638 659.

Sir,

I am directed to state that on consideration of the recommendations of the Task Force of the All India Council for Technical Education(AICTE), the AICTE has accorded approval to the Tamilnadu College of Engineering, Karumathampatti, Coimbatore to conduct the Engineering courses for the academic year 1994-95, 1995-96 and 1996-97:

1.	Civil Engineering	30(Thirty)
2.	Mechanical Engineering	60(Sixty)
3.	Electronics & Communication Engg.	60(Sixty)
4.	Computer Science & Engineering	60(Sixty)
5.	Instrumentation & Control Engg.	60(Sixty)

The approval is subject to fullfilment of the specific & general conditions:

Specific Conditions

1. The conditions laid down in this Council's letter of No. 45-29/90 dated 29th June, 1993 and 28th December, 1992 remain unchanged.

General Conditions

1. The Management including the Governing Body of the College shall be constituted, and its Chairman shall be appointed as per the guidelines of AICTE.

2. No new courses shall be started or an ongoing course shall be discontinued by the institution without the prior approval of the AICTE.

3. The intake in any of the approved courses shall not be altered by the institution without the prior approval of the AICTE.

4. Adequate funds shall be available with the Institution to meet the financial obligations of recurring and non-recurring nature as prescribed by the AICTE, including Endowment Fund, as prescribed by the AICTE.

5. All infrastructural, instructional and other facilities shall be provided as per the AICTE norms prescribed from time to time.

6. Teaching and other staff shall be selected according to the procedure, qualifications, experience and pay scales as prescribed by AICTE from time to time, and that they shall be paid full salaries and allowances regularly and in time.

7. The tuition and other fees shall be charged as prescribed by the State Government within the overall criteria/limit prescribed by the AICTE from time to time.

8. The institution shall not charge any Capitation fee or donation for admission or other higher charges from the students/guardians of the students in any form.

9. Admissions shall be made on merits and as per the norms and guidelines of the AICTE.

10. The State Government policies for admissions of SC/ST, other weaker sections of Society etc., shall be followed by the Institution.

11. Institution by virtue of the approval by AICTE shall not automatically become eligible to receive financial grants or assistance from the Central or State Governments.

12. Institution shall maintain records and books of account as prescribed by the Competent Authority.

13. The Accounts of the Institution shall be audited by a Chartered Accountant or any agency authorised by the Competent Authority and shall be open for inspection by the AICTE or any body authorised by it.

14. The Institution shall be subject to a Special audit and inspection as prescribed by the AICTE.

15. Institution shall furnish requisite returns as prescribed by Competent Authority/AICTE for ensuring maintenance of standards.

16. The Institution may be visited by an officer or a Committee of the AICTE or of its Regional office from time to time to review the progress made by the Institution in fulfilling the conditions as laid down by the AICTE.

17. The Institution shall constitute a Planning and Monitoring Board (PMB) for the continuous monitoring of implementation of norms and standards of the AICTE. There shall be an evaluation of the institution in a plan period by the AICTE.

In the event of non-compliance of the guidelines, norms and conditions prescribed by the AICTE, the AICTE or a body or person(s) authorised by it shall be free to take measures for withdrawal of the approval or recognition, without consideration of any related issues and that liabilities arising out of such withdrawal would be solely that of the Trust/Society and/or institution.

The approval is further subject to full compliance with the SCHEME as prescribed by the Supreme Court in its Judgement dated 4.2.1993 with regard to WP(C) No.607 of 1992 in the case of Unni Krishnan, UP and others etc. etc., Vs State of Andhra Pradesh and others etc., and later Judgements, and the related guidelines and criteria as may be issued by the AICTE, UGC or the Central Government from time to time.

You are requested to kindly take appropriate action to implement the decision of the AICTE and communicate the progress made in this regard to the Southern Regional Committee (SRC) of the AICTE under intimation to this office.

Yours faithfully,

(B.L. Rama)
Under Secretary

F.No.2-15/BIII/RC(M)/9

Copy to:

1) The Regional Officer, Ministry of Human Resource Development, Southern Regional Office, 26, Haddows Road, Madras-600 006 with a request that the visit of a team to the College should be arranged by the end of academic year 1996-97 and the AICTE be kept informed about the fulfillment of the conditions as stipulated.

2) The Director of Technical Education, Government of Tamilnadu, Guindy, Madras.

3) The Registrar, Bharthiar University, Coimbatore-641 046.

4) The Principal, Tamilnadu College of Engineering, Karumathampatti, Coimbatore-638 659.

5) The Deputy Adviser (E), Planning Commission, Yojna Bhavan, Parliament Street, New Delhi-110 001.

6) Shri S.D. Awale, JEA (T), Department of Education, 'C' Wing, Shastri Bhavan, New Delhi-110 001.

7) The Director, Board of Apprenticeship Training (Southern Region), CIT Campus,Taramani, Madras-600 013.

8) The Principal, TTTI, Taramani, Madras-600 113.

9) The Programme Director, ISTE, IIT Campus, Hauz Khas, New Delhi-110 016.

10) TD.1 (Survey Unit), Department of Education, 'C' Wing, Shastri Bhavan, Dr. Rajendra Prasad Marg, New Delhi.

11) Survey Unit (AICTE).

12) Guard file for sanctions (AICTE).

(R.L. Rawat)
Under Secretary(Tech.)

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक संस्थान) (A STATUTORY BODY OF THE GOVERNMENT OF INDIA)

Prof. B.G. Sanganeshwara
Adviser(E&T)
F.No.730-52-754(E)/ET/97

Nov
Oct. 1997

To

The Secretary, Education Department
Govt. of Tamil Nadu
Secretariat, Fort St. George
Chennai - 600 009.

Sub :Extension of AICTE approval to the existing TAMILNADU COLLEGE OF ENGINEERING, PALAKISAKE,RAVI NAGAR,KARUMATHAMAPATTI, COIMBATORE DIST COIMBATORE 638 659 TAMIL NADU for conducting degree course(s) in Engg. & Tech..

Sir

I am directed to state that on consideration of the observations made by the Monitoring Committee and the recommendations made by the Southern Regional Committee, the All India Council for Technical Education (AICTE) has extended its earlier approval accorded to TAMILNADU COLLEGE OF ENGINEERING, PALAKISAKE,RAVI NAGAR,KARUMATHAMAPATTI, COIMBATORE DIST COIMBATORE 638 659 TAMIL NADU for 1997-2002 to conduct the following courses with an annual intake and duration as given below :

COURSE	LEVEL	INTAKE	DURATION (years)
CIVIL ENGINEERING	DEGREE	30	4
COMPUTER SCIENCE & ENGINEERING	DEGREE	60	4
ELECTRONICS & COMMUNICATION ENGG	DEGREE	60	4
INSTRUMENTATION & CONTROL ENGG	DEGREE	60	4
MECHANICAL ENGINEERING	DEGREE	60	4
TOTAL		270	

The Council shall inspect the institution for verification of facilities/compliance of various conditions stipulated in this letter, during November/ December of the last approved of academic year.

The Management/Institute/Trust or Society shall not announce admissions directly under any circumstances and shall lawfully abide by Admission Regulations notified by the AICTE vide GSR 476(E) dated 20.05.1994 based on the Hon'ble Supreme Court Judgment dated 04.02.1993 with regard to WP (C) No. 607 of 1992 in the case of Unni Krishanan JP and others etc. V/s. State Government of Andhra Pradesh and others etc. and later judgments.

In the event of infringement/contravention or non-compliance of any of the conditions, guidelines, norms, and regulations prescribed by the AICTE from time to time the AICTE or a body or person(s) authorized by it shall be free to take measures for withdrawal of the approval or recognition without consideration of any related issues and that liabilities arising out of such withdrawal would be solely that of the Management/Trust/Society and/or Institutions. AICTE may also inspect the institution at any time it may deem fit to note progress.

You are requested to kindly take appropriate action to implement the decision of the AICTE and continuously monitor the progress made by the institution and communicate it to the Southern Regional Committee of the AICTE under intimation to this office.

Yours faithfully,

(B.G. Sanganeshwara)

इंदिरा गांधी खेल परिसर, इन्द्रप्रस्थ.एस्टेट, नई दिल्ली - 110 002
Indira Gandhi Sports Complex, I.P. Estate, New Delhi - 110 002
Phone : 3379010/11/12/13/15/16/17/18 Fax : 011-3379002

अखिल भारतीय
तकनीकी शिक्षा परिषद्
(भारत सरकार का एक विधिक संस्थान)
ई-47,नई दिल्ली साउथ एक्सटेन्शन, भाग-I, नई दिल्ली-110049.
दूरभाष : 4629908, 4620637, 4620643, 4620815

ALL INDIA COUNCIL FOR
TECHNICAL EDUCATION
(A STATUTORY BODY OF THE GOVERNMENT OF INDIA)
D-47, N.D.S.E., PART-I NEW DELHI-110049
PHONE : 4629908, 4620637, 4620643, 4620815

Registered

No.F. 45-58/B-II/BOS(M)/93-AICTE/665 April 15, 1994

To,

The Secretary
Department of Education (21),
Fort-ST. George,
Madras - 600 009.

Subject: Approval to the Tamilnadu College of Engg., Coimbatore to conduct MBA Programme.

Sir,

I am directed to state that on the recommendations of the Task Force for management the All India Council for Technical Education, New Delhi has accorded conditional approval to conduct of following programmes in the Dept. of Management Studies at the Tamilnadu College of Engg., Coimbatore.

COURSE	INTAKE	PERIOD OF APPROVAL
Master of.Business Administration (Full Time 2 years)	45	1994-95 & 95-96

The approval is subject to the fulfillment of the conditions as per annexure. Copy of the Norms & Standards of Management Education, AICTE is enclosed for your reference please.

You are requested to kindly take necessary action in the matter and keep the SRC, Madras and this office informed of the progress made in this regard.

Yours faithfully,

(V.K. Sinha)
Consultant

Encl.:a/a.

No.F. 45-58/B-II/BOS(M)/93-AICTE

April 15, 1994

ANNEXURE

CONDITIONS FOR APPROVAL

1. The infrastructural, instructional and other facilities including teaching staff, equipment etc. shall be provided as per AICTE norms prescribed from time to time.

2. No new course(s) shall be started and no increase shall be made in the intake of these courses without the prior approval of the AICTE.

3. The teaching staff shall be in the pay-scales as per the AICTE guidelines prescribed from time to time.

4. A building with required space as per AICTE norms shall be provided exclusively for this programme.

5. A library shall be established with adequate number of titles, books, journals (both Indian & Foreign) etc.

6. A computer Centre with adequate number of terminals, Printers etc. shall be established.

7. The faculty shall be recruited as per norms, procedure, qualifications etc. as prescribed by the AICTE from time to time and the selection committee for recruitment shall have the representation of the University and the AICTE also.

8. The admissions shall be made only after adequate infrastructure and all other facilities are provided as per norms and guidelines of the AICTE/Govt. of India/State Govt. and that affiliation of the University has since been obtained.

10. The tuition and other fees shall be charged as prescribed by the by Competent Authority/State Govt. within the overall criteria prescribed by the AICTE from time to time.

11. The administrative, academic and financial records including accounts shall be maintained for the PG Diploma Programme. The accounts shall be audited annually by a Chartered Accountant and all the records and reports shall be open for inspection by the AICTE or anybody authorised by it.

12. The curriculum of the course, the procedure for evaluation/ assessment of students shall be in accordance with the norms prescribed by the AICTE.

13. The Management shall follow all conditions as may be laid down by the AICTE from time to time.

14. The endowment fund of Rs 10 lacs/- shall be created exclusively for the above programme and fixed deposit receipt shall be in the combined name of the Society and Director Technical Education or Nominee of the State Govt.

15. The institute by virtue of the approval given by AICTE shall not automatically become claimant to any financial grant or assistance from the Central or State Government.

16. The information furnished in respect of the proposal shall be factual and correct. In the event of any information found to be false, misleading or suppressed the approval accorded may be withdrawn by the AICTE.

17. The institution shall furnish requisite returns and reports as desired by AICTE in order to ensure proper maintenance of administrative and academic standards. The progress report on fulfilment of the above conditions as on 31st December, and 31st May of each year shall be submitted by the Institution to the AICTE during 1994-96.

18. This approval is further subject to full-compliance with the "SCHEME" as prescribed by the Supreme Court in its judgement dated 4.2.93 with regard to WP(c) No. 607 of 1992 in the case of UnniKrishnan and others etc. vs. State of Andhra Pradesh and others etc. and the related guidelines and criteria as may be issued by the AICTE, UGC or the Central Government from time to time.

19. In the event of non-compliance by the Society with regard to guidelines, norms and conditions laid down by AICTE from time to time, the AICTE or a body or person authorised by it will be free to take measures for withdrawal of its approval without consideration of any related issues and that all liabilities arising out of such a withdrawal would solely be that of the concerned Society.

20. An Expert Committee of the All India Board of Management Studies shall visit the institute during 1994-96 to verify the compliance of the conditions as laid down above and to make necessary recommendations for further extension of AICTE approval to the Institute.

(V.K. Sinha)
Consultant

No.F. 45-58/E-II/BOS(M)/93-AICTE April 15, 1994

Copy to :-

1. Regional Officer MHRD, Member Secretary, SWRC, AICTE, 26, (Department of Education), 26, Haddewn Raod, Shastri Bhavan, Madras 600 006.

   He is requested to kindly monitor the compliance with the conditions as laid down in this approval letter and keep the AICTE informed of the same.

2. The Director Technical Education, Govt. of Tamil Nadu, Guindy, Madras - 600 025.

3. The Registrar, Bharathiar University, Coimbatore- 641 046.

4. The Secretary & Correspondent, Tamil Nadu College of Engineering, Karumathampatti, Coimbatore - 638 659

5. The Deputy Adviser (E), Planning Commission, Yojana Bhavan, Parliament Street, New Delhi - 110 001.

6. Shri S.D. Awale, JEA(T), Department of Education, Shastri Bhavan, Dr. Rajendra Prasad Marg, New Delhi-1.

7. Shri Vijay Bharat, DEA(T), Department of Education, Shastri Bhavan, Dr. Rajendra Prasad Marg,New Delhi-1.

8. The Programme Director, Indian Society for Technical Education,IIT Campus,New Mehrauli Road,New Delhi-16.

9. TD.I (Survey Unit), Department of Education, Shastri Bhavan, Dr. Rajendra Prasad Marg, New Delhi-1.

10. Survey Unit (AICTE).

11. Guard file (AICTE).

(V.K. Sinha)
Consultant

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक संस्थान) (A STATUTORY BODY OF THE GOVERNMENT OF INDIA)

Prof. B.G. Sanganeshwara
Adviser(E&T)
F.No.730-52-754(E)/ET/97

Nov
Oct. 1997

To

The Secretary, Education Department
Govt. of Tamil Nadu
Secretariat, Fort St. George
Chennai - 600 009.

Sub :Extension of AICTE approval to the existing TAMILNADU COLLEGE OF ENGINEERING, PALAKISAKE,RAVI NAGAR,KARUMATHAMAPATTI, COIMBATORE DIST COIMBATORE 638 659 TAMIL NADU for conducting degree course(s) in Engg. & Tech..

Sir

I am directed to state that on consideration of the observations made by the Monitoring Committee and the recommendations made by the Southern Regional Committee, the All India Council for Technical Education (AICTE) has extended its earlier approval accorded to TAMILNADU COLLEGE OF ENGINEERING, PALAKISAKE,RAVI NAGAR,KARUMATHAMAPATTI, COIMBATORE DIST COIMBATORE 638 659 TAMIL NADU for 1997-2002 to conduct the following courses with an annual intake and duration as given below :

COURSE	LEVEL	INTAKE	DURATION (years)
CIVIL ENGINEERING	DEGREE	30	4
COMPUTER SCIENCE & ENGINEERING	DEGREE	60	4
ELECTRONICS & COMMUNICATION ENGG	DEGREE	60	4
INSTRUMENTATION & CONTROL ENGG	DEGREE	60	4
MECHANICAL ENGINEERING	DEGREE	60	4
TOTAL		270	

The Council shall inspect the institution for verification of facilities/compliance of various conditions stipulated in this letter, during November/ December of the last approved of academic year.

The Management/Institute/Trust or Society shall not announce admissions directly under any circumstances and shall lawfully abide by Admission Regulations notified by the AICTE vide GSR 476(E) dated 20.05.1994 based on the Hon'ble Supreme Court Judgment dated 04.02.1993 with regard to WP (C) No. 607 of 1992 in the case of Unni Krishanan JP and others etc. V/s. State Government of Andhra Pradesh and others etc. and later judgments.

In the event of infringement/contravention or non-compliance of any of the conditions, guidelines, norms, and regulations prescribed by the AICTE from time to time the AICTE or a body or person(s) authorized by it shall be free to take measures for withdrawal of the approval or recognition without consideration of any related issues and that liabilities arising out of such withdrawal would be solely that of the Management/Trust/Society and/or Institutions. AICTE may also inspect the institution at any time it may deem fit to note progress.

You are requested to kindly take appropriate action to implement the decision of the AICTE and continuously monitor the progress made by the institution and communicate it to the Southern Regional Committee of the AICTE under intimation to this office.

Yours faithfully,

(B.G. Sanganeshwara)

इंदिरा गांधी खेल परिसर, इन्द्रप्रस्थ.एस्टेट, नई दिल्ली - 110 002
Indira Gandhi Sports Complex, I.P. Estate, New Delhi - 110 002
Phone : 3379010/11/12/13/15/16/17/18 Fax : 011-3379002

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक संस्थान) (A STATUTORY BODY OF THE GOVERNMENT OF INDIA)

Prof. B.G. Sangameshwara
Adviser (E&T)

F.No.431/45-58/MCP(M)/94
August 18, 1998

The Secretary to Government,
Govt. of Tamil Nadu,
Higher Education Department,
Secretariate, Fort St. George,
Chennai-600 009.

Sub.:Extension of AICTE approval during 1998-99 and No-admission during 1999-2000 - Regarding.

Sir,

I am directed to state that on the recommendations of Task Force, the All India Council for Technical Education (AICTE) has decided to extend its earlier approval accorded to Tamil Nadu College of Engineering, Kammathampatti, Coimbatore - 638 659, for conducting following Master in Business Administration(MBA) programme for the session 1998-1999 with an annual intake and duration as given below. However, the Institution is directed not to admit any students during the academic session 1999-2000.

NAME OF THE COURSE	ANNUAL INTAKE	PERIOD OF APPROVAL
MBA	45 FULL TIME	1998-99

DURATION:- FULL TIME -> 2 YEARS, PART TIME -> 3 YEARS AND DIST.ED. -> 3 YEARS

This approval has been accorded subject to fulfillment of Norms and Standards & specific conditions as stipulated by Council.

On recommendations of the Task Force, it has further been decided that the Institute shall be inspected by an Expert Committee nominated by the Council and any further extension of approval shall be communicated only if the facilities available in the Institute conforms to the Norms and Standards & Guidelines stipulated by the Council.

In the event of non-compliance of the Norms and Standards as stipulated by the AICTE, the Council shall take further action to withdraw approval and the liability arising out of such withdrawal shall be solely that of the Management/Institute.

AICTE file

Yours faithfully

(B.G.Sangameshwara)

F.No.431/45-58/MCP(M)/94

COPY TO:

1. Director of Technical Education, Govt. of Tamil Nadu, Chennai-160 036.
2. Regional Officer, AICTE, Southern Regional Office, 26, Haddows Road, Chennai-600 113 (T.N.)
3. The Registrar, Bharthiar University
4. The Principal/Director, Tamil Nadu College of Engineering, Kammathampatti, Coimbatore - 638 659
5. Guard File.

(S.K.Prasad) 16/8
Asstt.Director

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(An Autonomous Body of the Govt. of India by Parliament Act (52), 1987)

प्रो. बी. जी. संगमेश्वर
Prof. B. G. Sangameshwara
सलाहकार
Advisor

S.NO. 44
F.No.431/45-58/MCP(M)/94
August 18, 1999

The Secretary to Government,
Govt. of Tamil Nadu,
Higher Education Department,
Secretariat Fort St. George,
Chennai - 600 009
Tamil Nadu

Sub.: Extention of AICTE approval to the existing **Tamil Nadu College of Engineering** Kammathampatti, Coimbatore - 638 659 for conducting Management programme(s).

Sir,

I am directed to state that on the recommendation of Expert Committee and the sub-committee of the All India Board for Management Studies, the All India Council for Technical Education (AICTE) has extended its earlier approval accorded to **Tamil Nadu College of Engineering Kammathampatti, Coimbatore - 638 659** for conducting following Management Programme(s) for the session **1999-2001** with an annual intake and duration as given below.

NAME OF THE COURSE	PREVIOUS INTAKE	PRESENT INTAKE	PERIOD OF APPROVAL
MBA FULL TIME	45	45	1999-2001

DURATION :- FULL TIME->2 YEARS, PART TIME->3 YEARS

This approval has been accorded subject to fulfillment of norms and Standards and general conditions as stipulated by Council.

Further, in the event of non-compliance of the Norms and Standards as stipulated by the AICTE, the Council shall take further action to withdraw approval and the liability arising out of such withdrawal shall be solely that of the Management/Institute.

The Council may inspect/visit the Institute any time it may deem fit to note progress/compliance.

Yours faithfully

(B.G.Sangameshwara) 18/8/99

Indira Gandhi Sports Complex, I. P. Estate, New Delhi -110 002

F.No.431/45-58/MCP(M)/94

Copy to:-

1. The Director of Technical Education, Govt. of Tamil Nadu, Chennai - 600 025

2. The Regional Office, All India Council for Technical Education, Shastri Bhavan, 26, Haddows Road, Chennai - 600 006.

   He is requested to closely monitor the compliance of norms and standards stipulated by the Council and keep the AICTE informed of the same

3. The Principal, Tamil Nadu College of Engineering Kammathampatti, Coimbatore - 638 659 with request to submit the compliance of deficiencies as follows within a period of three months from the date of issue of this letter.

   a) 5 National and International Journals on MBA be subscribed. 1000 latest books be added.
   b) More senior faculty be appointed.
   c) Software packages for Managerial application be procured and pentium III computer be added.

   The undertaking as enclosed at Annexure-II be immediately sent to the Council duly notorised on a non-judicial stamp paper.

4. The Registrar, BHARTHIAR Univ

   He is requested to complete the process of affiliation for facilitating admissions in the course(s) and intake approved by the Council.

5. Gaurd File.

(B.K. Tosh)
Assistant Director

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक संस्थान) (A STATUTORY BODY OF THE GOVERNMENT OF INDIA)

F.No 730-52-254(E)/ET/97
Date: June 22, 2001

To

Secretary to Government,
Govt. of Tamil Nadu,
Higher Education Department,
Secretariat, Fort St. George,
Chennai – 600 009

Subject: Extension of Approval, TAMILNADU COLLEGE OF ENGINEERING, PALANISAME RAVI NAGAR,KARUMATHAMAPATII, COIMBATORE, DIST COIMBATORE 638 659, , , for conduct of Degree (Engg.) programmes.

Sir,

I am directed to state that on consideration of the reports of the Expert Committee and on consultations with the concerned agencies in this regard, the All India Council for Technical Education (AICTE), is pleased to accord extension of approval to TAMILNADU COLLEGE OF ENGINEERING, PALANISAME, RAVI NAGAR,KARUMATHAMAPATII, COIMBATORE, DIST COIMBATORE 638 659, , , , only for the course(s) and intake capacity as given below with the specific conditions that admission shall be made through the Central Counseling by the Govt. of Tamil Nadu only:

COURSE(S)	PREVIOUS APPROVED INTAKE	REVISED APPROVED INTAKE	PERIOD OF APPROVAL
CIVIL ENGINEERING	30	30	2001-2003
COMPUTER SCIENCE & ENGG.	90	90	2001-2003
ELECTRONICS & COMMUNICATION ENGG	90	90	2001-2003
INFORMATION TECHNOLOGY	60	60	2001-2003
INSTRUMENTATION & CONTROL ENGG	60	60	2001-2003
MECHANICAL ENGINEERING	60	60	2001-2003
TOTAL	390.	390.	

This approval has been accorded subject to fulfillment of norms & standards of the Council for the course(s) and intake approved above.

Further the observations and specific conditions (if any) of the expert committee are annexed with this letter. The institution shall fulfill all the conditions without any delay. Non-fulfillment of the specific conditions will lead to withdrawal of approval without need of any more opportunity, as the institution is well aware of the deficiencies.

Contd...2/-

OFFICE-TCE

730-52-254(E)/ET/97

Further, in the event of infringement/contravention or non-compliance of the norms & standards prescribed by the AICTE during the last approved academic year, the Council shall take further action to withdraw approval to this case for admission during subsequent academic year and the liability arising out of such withdrawal of approval will be solely that of Management / Trust /Society and/or institutions .

The Council reserves the right to visit the Institution any time it may deem fit to verify the compliance of norms and standards of AICTE.

You are requested to kindly monitor the progress made by this institution for fulfillment of the norms & standards of the Council & keep the concerned Regional Committee and AICTE informed.

Yours faithfully

(Prof.R.S.Gaud)
Adviser (E&T)

copy to:

1. The Regional Officer, Southern Regional Office, AICTE, 26, Haddows Road, Shastri Bhawan, Chennai – 600 006

   He is requested to monitor compliance with the norms & standards and conditions stipulated by the Council and keep the concerned Regional Committee and the AICTE informed of the same.

   He is also requested to ensure the receipt of notorised undertaking as specified by the Council from the institution / management concerned within the stipulate time frame.

2. The Director of Technical Education. Govt. of Tamil Nadu , Chennai – 600 025

3. The Registrar, BHARATHIAR UNIVERSITY

   He is requested to complete the process of affiliation for facilitating admissions.

4. The Principal. TAMILNADU COLLEGE OF ENGINEERING, PALANISAME RAVI NAGAR,KARUMATHAMAPATTI, COIMBATORE DIST COIMBATORE 638 659

5. Guard File.

Principal

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक संस्थान) (A STATUTORY BODY OF THE GOVERNMENT OF INDIA)

F.No.: 730-52-254(E)/ET/97 Date: 30th April, 2003

ADMINISTRATIVE OFFICE
21 MAY 2003
TAMILNADU COLLEGE OF ENGINEERING
COIMBATORE-641 659

To
Secretary to Government,
Govt. of Tamil Nadu,
Higher Education Department,
Secretariat, Fort St. George,
Chennai – 600 009.

Sub: Extension of approval of AICTE to TAMILNADU COLLEGE OF ENGINEERING, PALANISAME, RAVI NAGAR,KARUMATHAMAPATII, COIMBATORE, DIST COIMBATORE 638 659, , , for academic year 2003-2004

Sir/Madam,

The Application/ Proposal and/ or the Compliance Report received from **TAMILNADU COLLEGE OF ENGINEERING, PALANISAME, RAVI NAGAR,KARUMATHAMAPATII, COIMBATORE, DIST COIMBATORE 638 659, , ,** has been processed as per laid down procedure, guidelines, policy and/or norms & standards of AICTE, mentioned in **AICTE Regulations and/ or "AICTE Hand Book for Approval Process".**

I am directed to state that the All India council for Technical Education (AICTE) is pleased to accord approval to **TAMILNADU COLLEGE OF ENGINEERING, PALANISAME, RAVI NAGAR,KARUMATHAMAPATII, COIMBATORE, DIST COIMBATORE 638 659, , ,** for extension of AICTE Approval/ Introduction of new course(s)/ Variation in intake (Increase/ Decrease), as applicable for **under-graduate degree level course(s) in Engineering /Technology** with annual intake for each course as given below:

Full Time Course (s)	Existing Annual Intake	Revised Approved Intake	Entry Level	Duration (years)	Period of Approval
CIVIL ENGINEERING	30	30	10+2	4	2003-05
MECHANICAL ENGINEERING	60	60	10+2	4	2003-05
ELECTRONICS & COMM. ENGG	90	90	10+2	4	2003-05
COMPUTER SCIENCE & ENGG.	90	90	10+2	4	2003-05
INSTRUM. & CONTROL ENGG	60	60	10+2	4	2003-05
INFORMATION TECHNOLOGY	60	60	10+2	4	2003-05
Total Annual Intake	390.	390.			

Contd..2

The approval accorded above is subject to fulfillment of the following Conditions:

1.All full time faculty members as per AICTE Norms must be recruited before making admissions.

2.The Institution must have Affiliation to a University for the above courses before making admissions. In the absence of such Affiliation, this Letter of approval shall be treated as Withdrawn. (**Order of the High Court of Madras in W.P. No. 33256 of 2002 and other Batch of Petitions**).

3.All the required Laboratories/ Workshops/ Machineries/ Equipment, as per approved syllabi of the affiliating University, must be operational before making admissions.

4.The approved course(s) shall commence as per the academic calendar of the Affiliating University.

5.If this Letter of approval is received by you after the closing date of State / National Level Central Counseling for Admissions in the concerned State / Union Territory, this Letter of approval will not be valid for making any admission during the above specified academic year, and shall be treated as withdrawn.

6.No excess admission shall be made by the Institution during any academic year.

7.Name of the Institution, Name of the Society/Trust, are not allowed to be changed without prior approval of AICTE. The name and title of the institution should be such that "**the Emblems and Names (Prevention of improper use) Act 12 (1950)**" of Government of India, is not violated in any manner.

The use of word "Indian" and /or "National" and/or "All India" and/or "All India Council" and/or Commission" in any part of the name of a Technical Institution and/ or any name whose abbreviated form leads to "IIM"/ "IIT"/"IISC"/"IIIT"/ "AICTE"/ "UGC" shall not be permitted. These restrictions will not be applicable for those institutions, which are established with the name approved by the Govt. of India.

8.In exercise of power conferred under 10(p) of the AICTE Act, AICTE, may inspect the Institution any time it may deem fit to verify the progress/ compliance or for any other purpose.

9. Any other condition(s) as may be specified by AICTE from time to time.

It may please be noted that consequent to judgement of Hon'ble Supreme Court delivered on 31/10/2002 in TMA Pai Case, the AICTE had issued interim policy regulations, which has been notified in the Gazette of India on 20/03/2003. All the provisions contained in the interim policy regulations shall be applicable for the academic year 2003-2004 in respect of all the AICTE approved institutions.

Contd...3

In the event of infringement/ contravention or non-compliance of the above Conditions and/or the provision of AICTE Act & Regulations/ Guidelines/ Norms & Standards as prescribed by AICTE, further actions leading to 'Reduced Intake' or "No Admission or Withdrawal of Approval, may be taken by AICTE and the liability arising out of such actions will be solely that of the Management of the Institution.

Yours faithfully,

(Prof. R.S. Gaud)
Adviser (UG)

Encl: (i) Suggested Improvements (Specific Conditions)

Copy to:

1. The Regional Officer, Southern Regional Office, AICTE, 26, Haddows Road, Shastri Bhavan, Chennai - 600 006.

2. The Director of Technical Education, Govt. of Tamil Nadu, Chennai – 600 025.

3. The Registrar, Anna University, Chennai.
   He is requested to complete the process of affiliation for facilitating admissions.

4. The Principal
   TAMILNADU COLLEGE OF ENGINEERING, PALANISAME
   RAVI NAGAR,KARUMATHAMAPATII, COIMBATORE
   DIST COIMBATORE 638 659

5. Guard File.

730-52-254(E)/ET/97
TAMILNADU COLLEGE OF ENGINEERING, PALANISAME
KARUMATHAMPATTI

SPECIFIC CONDITIONS / COMMENTS .

1 The vacant teaching faculty posts both at Sr. and Jr. level should be filled up by appointing persons having qualifications and experience as prescribed in AICTE norms maintaining the cadre proportion.

2. Core faculties should be paid as per AICTE norms.

(Prof. R.S.Gaud)
Adviser(E&T)

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का सांविधिक संस्थान) (A STATUTORY BODY OF THE GOVT. OF INDIA)

10

PROF. K. SUBRAMANIAN,
ADVISER (PGE&R)

ADMINISTRATIVE OFF
17 SEP 2004
TAMILNADU COLLEGE OF ENGINEE
COIMBATORE-641 659

CSE-0127
F.No.: PG/ME/2004/CSE-127
Date : 13.09.2004

Secretary, Education Department
Govt. of Tamil Nadu
Secretariat, Fort St. George
Chennai – 600 009

Sub: AICTE approval to TAMIL NADU COLLEGE OF ENGINEERING KARUMATHAMPATTI POST COIMBATORE DISTRICT, TAMIL NADU 641659 for the conduct of P.G. Course.

Sir,

I am directed to state that based on the recommendation of the Expert Committee, the Evaluation Committee constituted by the Council, Regional Committee and the subsequent decision by EC Sub-Committee, All India Council for Technical Education (AICTE) is pleased to accord approval to TAMIL NADU COLLEGE OF ENGINEERING KARUMATHAMPATTI POST COIMBATORE DISTRICT, TAMIL NADU 641659 for the academic year 2004-05, for the PG Course(s) as per intake given below:

COURSE(S)	APPROVED INTAKE				LEVEL	DURATION (YEARS)	PERIOD OF APPROVAL
	General Category	Sponsored	SC/ST	TOTAL			
COMPUTER & COMMUNICATION ENGG.	10	05	03	18	ME	2 Years	2004-06

The approval has been accorded subject to fulfillment of general conditions as per norms and standards prescribed by AICTE and also specific conditions (if any, given).

The council may inspect/visit the institution any time it may deem fit to assess if the Norms & Standards as stipulated by AICTE are fulfilled and/or to verify the progress/compliance.

The admission will be made in accordance with the AICTE guidelines given as Annexure – I to this letter.

In the event of infringement/contravention or non-compliance of the norms and standards as prescribed by the AICTE, the Council shall take further action to withdraw approval and the liability arising out of such withdrawal of approval will be solely that of Management/Trust/Society and/or Institution.

(K. SUBRAMANIAN)

Copy to :-

1. The Director/Principal,
   TAMIL NADU COLLEGE OF ENGINEERING
   KARUMATHAMPATTI POST
   COIMBATORE DISTRICT,
   TAMIL NADU
   -641659
2. The Regional Officer, SRO, AICTE, 26, Haddows Road, Shastri Bhavan Chennai – 600006
3. Guard File (AICTE)
4. Office Copy

(K. SUBRAMANIAN)
Adviser (PGE&R)

PROF. K. SUBRAMANIAN,
ADVISER (PGE&R)

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक निकाय) (A STATUTORY BODY OF THE GOVT. OF INDIA)

CE-27
F.No.: PG/ME/2004/CE-27
Date : 25.06.2004

Secretary, Education Department
Govt. of Tamil Nadu
Secretariat, Fort St. George
Chennai – 600 009

Sub: AICTE approval to TAMIL NADU ECOLLEGE OF ENGINEERING KARUMATHAMPATTI POST COIMBATORE DISTRICT, TAMIL NADU 641659 for the conduct of P.G. Course.

Sir,

I am directed to state that based on the recommendation of the Expert Committee, the Evaluation Committee constituted by the Council, Regional Committee and the subsequent decision by EC Sub-Committee, All India Council for Technical Education (AICTE) is pleased to accord approval to TAMIL NADU ECOLLEGE OF ENGINEERING KARUMATHAMPATTI POST COIMBATORE DISTRICT, TAMIL NADU 641659 for the academic year 2004-05, for the PG Course(s) as per intake given below:

COURSE(S)	APPROVED INTAKE				LEVEL	DURATION (YEARS)	PERIOD OF APPROVAL
	General Category	Sponsored	SC/ST	TOTAL			
STRUCTURAL ENGINEERING	10	05	03	18	ME	2 Years	2004-06

The approval has been accorded subject to fulfillment of general conditions as per norms and standards prescribed by AICTE and also specific conditions (if any, given).

The council may inspect/visit the Institution any time it may deem fit to assess if the Norms & Standards as stipulated by AICTE are fulfilled and/or to verify the progress/compliance.

The admission will be made in accordance with the AICTE guidelines given as Annexure – I to this letter.

In the event of infringement/contravention or non-compliance of the norms and standards as prescribed by the AICTE, the Council shall take further action to withdraw approval and the liability arising out of such withdrawal of approval will be solely that of Management/Trust/Society and/or Institution.

(R. SUBRAMANIAN)

Copy to :-

1. The Director/Principal,
   TAMIL NADU ECOLLEGE OF ENGINEERING
   KARUMATHAMPATTI POST
   COIMBATORE DISTRICT,
   TAMIL NADU
   -641659
2. The Regional Officer, SRO, AICTE, 26, Haddows Road, Shastri Bhavan
   Chennai – 600006
3. Guard File (AICTE)
4. Office Copy

(R. SUBRAMANIAN)
Adviser (PGE&R)

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक निकाय) - (A STATUTORY BODY OF THE GOVT. OF INDIA)

F. No. 730-52-254(E)/ET/97
11.11. 2005

To
The Principal Secretary,
(Education Department),
Govt. of Tamil Nadu
Secretariat, Fort St. George,
Chennai – 600 009

Sub: AICTE approval to Tamil Nadu Collee of Engineering, Palanisame Ravi Nagar, Karumathapatti Post, Coimbatore Dist - 641 659 Tamil Nadufor the Academic year 2005-06.

Ref : Council's Letter of even No. 730-52-2[illegible]/ET/97 dated [illegible]2005

Sir/Madam,

This is in continuation to Council's letter of even no. dt. **24.06.2005** on the subject cited above. The appeal (along with the relevant documentary evidence) submitted by the Institute for reconsideration of its proposal for increase in intake / additional course/ variation in intake / PG programme has been processed as per laid down procedure, guidelines, policy and / or norms & standards of AICTE as **displayed in AICTE website on 29th August 2005".**

Based on the recommendation of Appellate Committee & EC-Sub Committee, the All India Council for Technical Education (AICTE) is pleased to accord approval to **Tamil Nadu Collee of Engineering, Palanisame Ravi Nagar, Karumathapatti Post, Coimbatore Dist - 641 659 Tamil Nadu** for Introduction of new course(s)/ Variation in intake (Increase/Decrease). The annual intake for the academic year 2005-2006 is as given below:

FULL TIME COURSE(S)	Existing Annual Intake for 2005-06	Revised Approved Intake for 2005-06
Automobile Engineering	0	60
Civil Engineering	30	60
Computer Science & Engg	90	90
Electrical & Electronics Engineering	0	60
Electronics & Comm. Engg	90	90
Information Technology	60	60
Instrumenation & Control Engg.	60	60
M.E.-Computer & Communication	18	18
M.E.-Structural Engineering	18	18
MBA (FT) Standalone	60	60
MCA (FT)	0	30
Mechanical Engineering	60	60
Total Annual Intake	486	666

Note: ***The variation (wherever applicable) with respect to existing approved intake in a branch for the year 2005-2006 shall be effective only if the College has not admitted more students than the revised approved intake through counseling and admission against management quota.**

The above approval is subject to fulfillment of following specific conditions:

- For the additional course/ increase in intake sanctioned above, the required faculty must be recruited and their joining report Biodata along with photograph be sent.
- The space requirement for the additional intake / increase in intake sanctioned should be made available. The proof of creation of required space alongwith necessary documentary evidence should be sent.
- Required facilities such as laboratory, computer, library, books, Journals etc be provided and proof thereof be sent
- The compliance on (1)-(3) above be sent to Regional Office latest by 31/12/2005
- AICTE reserves the right to conduct surprise inspection to verify the compliance already submitted by the institution by 31/08/2005 and take suitable action as it may deem fit.

इंदिरा गांधी खेल परिसर, [illegible] नई दिल्ली - 110002
Indira Gandhi Sports Complex, I.P. Estate, New Delhi - 110 002
दूरभाष / Phone : 23392506, 63-65-68, 71, 73-75 फैक्स / Fax : 011-23392504
वेबसाईट / Website : www.aicte-india.org

All the other conditions as communicated in Council's earlier approval letter remains unchanged.

The admission against this approved intake for the academic year 2005-2006 shall be governed by the Admission norms laid down by the concerned Government and University authorities. The approved intake is valid only for the academic year 2005-2006.

In the event of infringement / contravention or non-compliance of the above conditions and / or the provision or AICTE Act & Regulations / Guidelines / Norms & Standards as prescribed by AICTE, further actions leading to "Reduced Intake" or "No Admission" or "Withdrawal of Approval" may be taken by AICTE and the liability arising out of such actions will be solely that of the Management of the Institutions.

Yours faithfully,

(Dr. P. Venkateswara Rao)
Joint Director (UG, PG)

Copy to:

- The Principal,
  Tamil Nadu Collee of Engineering, Palanisame
  Ravi Nagar, Karumathapatti Post,
  Coimbatore Dist - 641 659
  Tamil Nadu
- The Regional Officer, AICTE Southern Regional Office, 26, Haddows Road, Shastri Bhawan, Chennai - 600 006
- Director of Technical Education, Govt. of Tamil Nadu, Chennai – 600 025.
- The Registrar, ANNA UNIVERSITY
- Guard File.

अखिल भारतीय तकनीकी शिक्षा परिषद
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक निकाय) (A STATUTORY BODY OF THE GOVT. OF INDIA)

F. No. 730-52-254(E)/ET/97

Date: 24/05/2006

To,

The Principal Secretary
(Education Department)
Govt. of TAMIL NADU,
Secretariat, Fort St. George,
Chennai-600 009.

Sub: Extension of approval to **TAMIL NADU COLLEGE OF ENGINEERING, PALANISAME RAVI NAGAR, KARUMATHAPATTI POST, COIMBATORE DIST - 641 659 TAMIL NADU** for the academic year 2006-07.

Sir,

As per the Regulations notified by the Council vide F No. 37-3/Legal/2004 dated 28th November 2005 and norms, standards procedures and conditions prescribed by the Council from time to time and based on the recommendations of Appraisal Committee/ Expert Committee, I am directed to convey the extension of approval of the Council to **TAMIL NADU COLLEGE OF ENGINEERING, PALANISAME RAVI NAGAR, KARUMATHAPATTI POST, COIMBATORE DIST - 641 659 TAMIL NADU** for conduct of the following courses with the intake indicated below.

Name of the Course(s)	Existing Intake 2005-06	Revised Intake 2006-07	Period of approval
AUTOMOBILE ENGINEERING	60	60	
CIVIL ENGINEERING	60	60	
COMPUTER SCIENCE & ENGG.	90	90	
ELECTRICAL & ELECTRONICS ENGIN	60	60	2006-07
ELECTRONICS & COMM. ENGG.	90	90	
INFORMATION TECHNOLOGY	60	60	
INSTRUMENTATION & CONTROL ENGG	60	60	
M.E.-COMPUTER & COMMUNICATION	18	18	
M.E.-STRUCTURAL ENGINEERING	18	18	
MCA (LE)	30	30	
MECHANICAL ENGG.	60	60	
	606	606	

The above approval is subject to rectification of the following observations / deficiencies / specific conditions by 31st August 2006

- Faculty :
  - Faculty in the Science & Humanities should be appointed in the ratio of 1:15 for the incoming batch of students.
- Computer Facility :
  - Computers may be provided as per AICTE norms.
- Library Facility :
  - Books, titles and journals should be made available as per AICTE norms.
- Others :
  - The deficiencies communicated in the last approval letter are not fully complied with.

इंदिरा गांधी खेल परिसर, इन्द्रप्रस्थ एस्टेट, नई दिल्ली – 110002
Indira Gandhi Sports Complex, I. P. Estate, New Delhi-110 002
दूरभाष / Phone : 23392506, 63-65-68, 71, 73 -75 फैक्स / Fax : 011-23392554
वैबसाइट / Website : www.aicte.ernet.in

te: . The mandatory disclosure in prescribed format if not hosted on the website should be hosted by 31st May, 2006, iling which action would be initiated as per the rules and regulations of the AICTE including No Admission / Withdrawal f approval.

he institution is required to submit two copies of the Compliance Report, indicating the rectification of deficiencies along with andatory disclosure and details of faculty recruited for each course in the prescribed format (available at AICTE Website ww aicte-emet.in) to the concerned Regional Office latest by 31st August 2006 for consideration of approval beyond the session 006-07.

he Compliance Report must be accompanied with a processing fee of Rs. 40,000/- in the form of demand draft in the favour of lember Secretary, AICTE, payable at New Delhi. In the absence of processing fee the Compliance Report will not be entertained. ollowing the Compliance report, the Council would verify the status in respect of rectification of deficiencies through surprise andom inspection without any prior notice.

he above approval if granted after rectification of deficiencies would be subject to the fulfillment of the following general conditions:

1 That the management shall provide adequate funds for development of land and for providing related infrastructural, instructional and other facilities as per norms and standards laid down by the Council from time to time and for meeting recurring expenditure.

2. (a) That the admission shall be made only after adequate infrastructure and all other facilities are provided as per norms and guidelines of the AICTE.

(b) That the admissions shall be made in accordance with the regulations notified by the Council from time to time.

(c) That the curriculum of the course, the procedure for evaluation/ assessment of students shall be in accordance with the norms prescribed by the AICTE.

(d) That the Institution shall not allow closure of the Institution or discontinuation of the course(s) or start any new course(s) or alter intake capacity of seats without the prior approval of the Council.

(e) That no excess admission shall be made by the Institution over and above the approved intake under any circumstances. In case any excess admission is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution

(f) That the institutions shall not have any collaborative arrangements with any Indian and/ or Foreign Universities for conduct of technical courses other than those approved by AICTE without obtaining prior approval from AICTE. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution

(g) That the Institution shall not conduct any course(s) in the field of technical education in the same premises/ campus and / or in the name of the Institution without prior permission/ approval of AICTE. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution

(h) The institution shall not conduct any non-technical course(s) in the same premises/ campus under any circumstances. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution

3 That the institution shall operate only from the approved location, and that the institution shall not open any off campus study centers/ extension centers directly or in collaboration with any other institution/ university/ organization for the purpose of imparting technical education without obtaining prior approval from the AICTE.

4 That the tuition and other fees shall be charged as prescribed by the Competent Authority within the overall criteria prescribed by the Council from time to time. No capitation fee shall be charged from the students/ guardians of students in any form.

5 That the accounts of the Institution shall be audited annually by a certified Chartered Accountant and shall be open for inspection by the Council or any body or persons authorized by it.

6 That the Director/ Principal and the teaching and other staff shall be selected according to procedures, qualifications and experience prescribed by the Council from time to time and pay scales are as per the norms prescribed by the Council from time to time.

7 (a) That the institution shall furnish requisite returns and reports as desired by AICTE in order to ensure proper maintenance of administrative and academic standards.

(b) That the technical institution shall publish an information booklet before commencement of the academic year giving details regarding the institution and courses/ programmes being conducted and details of infrastructural facilities including faculty etc. in the form of mandatory disclosure. The information booklet may be made available to the stakeholders of the technical education on cost basis. The mandatory disclosure information shall be put on the Institution Website. The information shall be revised every year with updated information about all aspects of the institution.

3 That the institution shall operate only from the approved location, and that the institution shall not open any off campus study centers/ extension centers directly or in collaboration with any other institution/ university/ organization for the purpose of imparting technical education without obtaining prior approval from the AICTE.

4 That the tuition and other fees shall be charged as prescribed by the Competent Authority within the overall criteria prescribed by the Council from time to time. No capitation fee shall be charged from the students/ guardians of students in any form.

5 That the accounts of the Institution shall be audited annually by a certified Chartered Accountant and shall be open for inspection by the Council or any body or persons authorized by it.

6 That the Director/ Principal and the teaching and other staff shall be selected according to procedures, qualifications and experience prescribed by the Council from time to time and pay scales are as per the norms prescribed by the Council from time to time.

7 (a) That the institution shall furnish requisite returns and reports as desired by AICTE in order to ensure proper maintenance of administrative and academic standards.

(b) That the technical institution shall publish an information booklet before commencement of the academic year giving details regarding the institution and courses/ programmes being conducted and details of infrastructural facilities including faculty etc. in the form of mandatory disclosure. The information booklet may be made available to the stakeholders of the technical education on cost basis. The mandatory disclosure information shall be put on the Institution Website. The information shall be revised every year with updated information about all aspects of the institution.

(c) That it shall be mandatory for the technical institution to maintain a Website providing the prescribed information. The Website information must be continuously updated as and when changes take place.

(d) That a compliance report in the prescribed format along with mandatory disclosures on fulfillment of the above conditions, shall be submitted each year by the Institution within the time limit prescribed by the Council from time to time **i.e. 31st August 2006 for the current year.**

(e) That if Technical Institution fails to disclose the information or suppress and/ or misrepresent the information, appropriate action could be initiated including withdrawal of AICTE approval.

8 That all the laboratories, workshops etc. shall be equipped as per the syllabi of the concerned affiliated University and shall be in operational condition before making admissions.

9 That a library shall be established with adequate number of titles of books, journals (both Indian & Foreign) etc as per AICTE norms.

10 That a computer center with adequate number of terminals, Printers etc. shall be established as per AICTE norms.

11 AICTE may carry out random inspections round the year for verifying the status of the Institutions to ensure maintenance of norms and standards.

12 That the AICTE may also conduct inspections with or without notifying the dates to verify specific complaints of mis-representation, violation of norms and standards, mal-practices etc.

13 That the Institution by virtue of the approval given by Council shall not automatically become claimant to any grant-in-aid form the Central or State Government.

14 That the Management shall strictly follow further conditions as may be specified by the Council from time to time.

15 In the event of non-compliance by the Tamilnadu College of Engg.,, Karumathampatti Post,, Coimbatore, Coimbatore Dist. - 641 659 with regard to guidelines, norms and conditions prescribed from time to time the Council shall be free to take measures for withdrawal of its approval or recognition, without consideration of any related issues and that all liabilities arising out of such withdrawal would solely be that of Tamilnadu College of Engg.,, Karumathampatti Post,, Coimbatore, Coimbatore Dist. - 641 659

Yours faithfully,

Dr. Rajnish Shrivastava
Advisor- UG/PG (M&T)

Copy to:

1. The Principal,
   Tamilnadu College of Engg.,,
   Karumathampatti Post,, Coimbatore,
   Coimbatore Dist. - 641 659

2. The Regional Officer, AICTE Southern Regional Office, 26, Haddows Road, Shastri Bhawan, Chennai - 600 006

3. The Director of Technical Education, Govt. of Tamil Nadu, Chennai- 600 025 (TN)

3. The Registrar, Anna University, Chennai
   (He is requested to complete the process of affiliation for facilitating admissions).

4. Guard File (UG/PG).

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

(भारत सरकार का एक सांविधिक निकाए) (A STATUTORY BODY OF THE GOVT. OF INDIA)

5584

17 JUN 2008

F.No. 730-52-254(E)/ET/97
Dt. 06/06/2008

To
The Principal Secretary
(Education Department)
Govt. of Tamil Nadu,
Secretariat, Fort St. George,
Chennai – 600 009.

Sub: Extension of approval to **TAMIL NADU COLLEE OF ENGINEERING, PALANISAME, RAVI NAGAR, KARUMATHAPATTI POST, COIMBATORE DIST – 641 659 TAMIL NADU** for the academic year 2008-2009 - regarding.

Ref.: Letter of even no dated 29/04/2008

Sir,

In continuation to Council's letter referred above and in pursuance of the compliances submitted by institution, the revised intake for the academic year 2008-2009 in respect of **TAMIL NADU COLLEE OF ENGINEERING, PALANISAME, RAVI NAGAR, KARUMATHAPATTI POST, COIMBATORE DIST – 641 659 TAMIL NADU** is as under:

Name of the Course(s)		Existing Intake	Revised Intake	Period of approval
AUTOMOBILE ENGINEERING		45	60	2008-2009
CIVIL ENGINEERING		60	60	
COMPUTER SCIENCE & ENGG.		120	120	
ELECTRICAL & ELECTRONICS ENGIN		60	60	
ELECTRONICS & COMM. ENGG.		120	120	
INFORMATION TECHNOLOGY		120	120	
INSTRUMENTATION & CONTROL ENGG		60	60	
M.E.-COMPUTER & COMMUNICATION		18	18	
M.E.-STRUCTURAL ENGINEERING		18	18	
MCA (FT)		60	60	
MECHANICAL ENGG.		90	90	
	TOTAL	771	799	

All other terms and conditions in the letter referred above remain unchanged.

Yours faithfully,

(Prof. Harish C. Rai)
Adviser (E&T)

Copy to:

1. The Regional Officer,
AICTE Southern Regional Office, AICTE
26, Haddows Road, Shastri Bhavan,
Chennai – 600 006.

2. The Principal,
TAMIL NADU COLLEE OF ENGINEERING,
PALANISAME, RAVI NAGAR, KARUMATHAPATTI POST,
COIMBATORE DIST – 641 659 TAMIL NADU

3. The Director of Technical Education,
Govt. of Tamil Nadu,
Chennai – 600 025.

4. The Registrar, Anna University
Chennai

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक निकाय) (A STATUTORY BODY OF THE GOVT. OF INDIA)

10033

File No : 730-52-254(E)/ET/97
Date: 25June 2006

To,
The Secretary, (Education Department),
Govt. of Tamil Nadu,
Secretariat, Fort St. George,
Chennai 600 009

Sub: **AICTE approval for extension / increase / variation in intake / introduction of additional courses to TAMIL NADU COLLEGE OF ENGINEERING, PALANISAME, RAVI NAGAR, KARUMATHAPA POST, COIMBATORE DIST - 641 659 TAMIL NADU for the year 2006-07 - regarding**

Ref: **Letter of even no 730-52-254(E)/ET/97 dated**

Sir,

In continuation of the Council's letter referred above, the revised intake for the year 2006-07 in respect of **TAMIL NADU COLLEGE OF ENGINEERING, PALANISAME, RAVI NAGAR, KARUMATHAPATTI POST - 641 659 TAMIL NADU** is as under:

Name of the Course(s)	Existing Approved Intake 2006-07	Revised Approved Intake 2006-07
AUTOMOBILE ENGINEERING	60	60
CIVIL ENGINEERING	60	60
COMPUTER SCIENCE & ENGG.	90	120
ELECTRICAL & ELECTRONICS ENGIN	60	60
ELECTRONICS & COMM. ENGG.	90	120
INFORMATION TECHNOLOGY	60	60
INSTRUMENTATION & CONTROL ENGG	60	60
M.E.-COMPUTER & COMMUNICATION	18	18
M.E.-STRUCTURAL ENGINEERING	18	18
MCA (FT)	30	60
MECHANICAL ENGG.	60	90
Total	606	726

Note:- The additional intake is being granted based on the projections shown in the Detailed Project Report regarding additional built up space, faculty and other facilities for the proposed intake. It may be noted that all facilities including additional built up area and appointment of faculty should be made available before the commencement of the next academic session. Random surprise inspections would be carried out to verify facilities and if the institute is found deficient in fulfillment of norms & standards of AICTE, appropriate action would be initiated by the Council.

All other terms and conditions in the letter referred above remain unchanged.

Yours faithfully,

(Prof. Harish C. Rai)
Adviser UG/PG(E&T)

इंदिरा गांधी खेल परिसर, इन्द्रप्रस्थ एस्टेट, नई दिल्ली – 110002
Indira Gandhi Sports Complex, I. P. Estate, New Delhi-110 002
दूरभाष / Phone : 23392506, 63-65-68, 71, 73 -75 फैक्स / Fax : 011-23392554
वैबसाइट / Website : www.aicte.ernet.in

Copy to:

The Principal,
TAMIL NADU COLLEGE OF ENGINEERING, PALANISAME,
RAVI NAGAR, KARUMATHAPATTI POST,
COIMBATORE DIST - 641 659 TAMIL NADU

The Regional Officer,
AICTE Southern Regional Office,
26, Haddows Road,
Shastri Bhawan,
Chennai - 600 006

Director of Technical Educatio..,
Govt. of Tamil Nadu,
Chennai-600 025

The Registrar,
Anna Universtity,
Sardar Patel Road,
Guindy, Chennai-600 025

Guard File (UG/PG).

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक निकाय) (A STATUTORY BODY OF THE GOVT. OF INDIA)

Revised Letter

F. No. 730-52-254(E)/ET/97
2nd August, 2007

To,
The Principal Secretary
(Education Department)
Govt. of TAMIL NADU,
Secretariat, Fort St. George,
Chennai-600 009.

Sub:- AICTE Approval for extension/ increase / Variation in intake / introduction of additional courses to TAMIL NADU COLLEE OF ENGINEERING, PALANISAME, RAVI NAGAR, KARUMATHAPATTI POST, COIMBATORE DIST – 641 659 TAMIL NADU for the year 2007-08-reg.

Ref: **Letter of even no . Dated . 09/05/2007**

Sir,

As per the Regulations notified by the Council vide F. No. 37-3/Legal /2004 dated 14th September 2006 and norms, standards, procedures and conditions prescribed by the Council from time to time and based on the recommendations of Appraisal Committee/ Hearing Committee, I am directed to convey the revised intake for the year 2007-08 in respect of TAMIL NADU COLLEE OF ENGINEERING, PALANISAME, RAVI NAGAR, KARUMATHAPATTI POST, COIMBATORE DIST – 641 659 TAMIL NADU is as under:

Name of the Course (s)	Existing Intake	Revised Intake	Period of Approval
AUTOMOBILE ENGINEERING	60	60	
CIVIL ENGINEERING	60	60	
COMPUTER SCIENCE & ENGG.	120	120	
ELECTRICAL & ELECTRONICS ENGIN	60	60	
ELECTRONICS & COMM. ENGG.	120	120	
INFORMATION TECHNOLOGY	60	120#	
INSTRUMENTATION & CONTROL ENGG	60	60	
M.E.-COMPUTER & COMMUNICATION	18	18	
M.E.-STRUCTURAL ENGINEERING	18	18	2007-08
MCA (FT)	60	60	
MECHANICAL ENGG.	90	90	
TOTAL	726	786	

Note: * The approval for additional course (s)/ increase in intake/ variation in intake is valid for two years from the date of issue of this letter for getting affiliation with respective university and fulfilling State Government requirements of admission.

 # Increase is subject to revalidation of Accreditation which has expired on 28th March, 2007.

इंदिरा गांधी खेल परिसर, इन्द्रप्रस्थ एस्टेट, नई दिल्ली – 110002
Indira Gandhi Sports Complex, I. P. Estate, New Delhi-110 002
दूरभाष / Phone : 23392506, 63-65-68, 71, 73 -75 फैक्स / Fax : 011-23392554
वैबसाइट / Website : www.aicte.ernet.in

The additional intake is being granted based on the projections shown in the Detailed Project Report regarding additional built up space, faculty and other facilities for the proposed intake. It may be noted that all facilities including additional built area and faculty should be made available before the commencement of the next academic session. Random surprise inspection would be carried out to verify facilities and if the institute is found deficient in fulfillment of Norms & Standards of AICTE, appropriate action would be initiated by the Council.

Please note that all other terms & conditions of the earlier letter referred above will remain unchanged.

Yours faithfully,

(Prof. Harish C. Rai)
Adviser- UG/PG (E&T)

Copy to:-

1. TAMIL NADU COLLEE OF ENGINEERING,
   PALANISAME, RAVI NAGAR, KARUMATHAPATTI POST,
   COIMBATORE DIST – 641 659 TAMIL NADU
2. The Regional Officer, AICTE Southern Regional Office, 26, Haddows Road, Shastri Bhawan, Chennai - 600 006
3. Director of Technical Education, Govt. of TAMIL NADU, Chennai-600 025.
4. The Registrar, Anna University, Sardar Patel Road, Guindy, Chennai-600 025.
5. Guard File (UG/PG).

All India Council for Technical Education
(A Statutory Body under Ministry of HRD, Govt of India)
7th floor, Chandralok Building, Janpath, New Delhi-110 001
Phone: 11-23724151-57 FAX: 11-23724183 www.aicte-India.org

No. : Southern Region/1-5104051/2010/EOA

August 23, 2010

To,
Principal Secretary (Higher Education) Govt. of Tamil Nadu, N. K. M. Bld.
6th Floor Secretariat, Chennai-600009

Sub. : Extension of approval for the academic year 2010-11.

Sir,

In terms of the Regulations notified by the Council vide F. No. 37-3/Legal/2010 and norms, standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the extension of approval of the Council to :

TAMILNADU TECHNICAL EDUCATION FOUNDATION, TAMILNADU COLLEGE OF ENGINEERING, PALANISAME RAVI NAGAR KARUMATHAMPATTI POST, COIMBATORE, TAMIL NADU, PIN : 641659

for conduct of the following courses with the intake indicated below in the academic year 2010-11:

Sr. No.	Program	Level	Shift	Course	Intake 2009-10	Intake 2010-11
1	Engg. / Tech.	UG	First Shift	MECHANICAL ENGG.	90	90
2	Engg. / Tech.	UG	First Shift	INSTRUMENTATION & CONTROL ENGG.	60	60
3	Engg. / Tech.	UG	First Shift	INFORMATION TECH.	120	120
4	Engg. / Tech.	UG	First Shift	ELECTRONICS & COMMN. ENGG.	120	120
5	Engg. / Tech.	UG	First Shift	ELECTRICAL & ELECTRONICS ENGG.	60	60
6	Engg. / Tech.	UG	First Shift	COMPUTER SCIENCE & ENGG.	120	120
7	Engg. / Tech.	UG	First Shift	CIVIL ENGG.	60	60
8	Engg. / Tech.	UG	First Shift	AUTOMOBILE ENGG.	60	60
9	~~COMPUTER APPLICATION~~	PG	First Shift	MCA [FULL TIME]	60	60
10	Engg. / Tech.	PG	First Shift	STRUCTURAL ENGG.	18	18
11	Engg. / Tech.	PG	First Shift	COMPUTER & COMMUNICATION	18	18

The above mentioned approval is subject to the condition that :

TAMILNADU TECHNICAL EDUCATION FOUNDATION, TAMILNADU COLLEGE OF ENGINEERING, PALANISAME RAVI NAGAR KARUMATHAMPATTI POST, COIMBATORE, TAMIL NADU, PIN : 641659

shall follow and adhere to the regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal and hard copy to Regional Office.

All India Council for Technical Education
(A Statutory Body Under Ministry of HRD,Govt of India)
7th Floor, Chandralok Building, Janpath, New Delhi-110 001
Phone: +91-2372 4151-57 FAX: +91-2372 4183 www.aicte-india.org

Anti Ragging :- The approval is subject to the institutions strictly complying with all the provisions made under the Anti ragging regulation notified by council vide F.No. 37/Legal/AICTE/2009 dated 1-7-2009 failing which, it will be liable to any action defined under clause 9(4) of this regulation.

Yours faithfully,

Dr. S. G. Bhirud
Director

Copy to :

1. The Regional Office, Southern Region, Tamil Nadu
2. The Director of Technical Education, ~~Govt of Delhi~~
3. Guard File (AICTE)
4. The Registrar, Affiliating University
5. The Principal / Director,
   TAMILNADU TECHNICAL EDUCATION FOUNDATION, TAMILNADU COLLEGE OF ENGINEERING, PALANISAME RAVI NAGAR KARUMATHAMPATTI POST, COIMBATORE, TAMIL NADU, PIN : 641659

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

F.No. Southern/1-396972311/2011/EOA

Date: 01-09-2011

To,
The Principal Secretary
(Higher Education) Govt. of Tamil Nadu,
N. K. M. Bld. 6th Floor Secretariat,
Chennai-600009

Sub: Extension of approval for the academic year 2011-12.
Ref : Application of the Institution for Extension of Approval for the Year 2011-12

Sir/Madam,

In terms of the Regulations notified by the Council vide F.No. 37-3/Legal/2011 dated 10/12/2010 and norms, standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the extension of approval of the Council to

Regional Office	Southern	Application Id	1-396972311
		Permanent Id	1-5104051
Name of the Institute	TAMILNADU COLLEGE OF ENGINEERING	Institute Address	PALANISAME RAVI NAGAR KARUMATHAMPATTI POST,COIMBATORE,COIMBATORE,Tamil Nadu,641659
Name of the Society/Trust	TAMILNADU TECHNICAL EDUCATION FOUNDATION	Society/Trust Address	PALANISWAMI RAVI NAGAR,KARYUMATHAMPATTI.POST,641659,KARU MATHAMPATTI,COIMBATORE,Tamil Nadu,641659
Institute Type	Unaided - Private		

to conduct following courses with the intake indicated below for the academic year 2011-12

Application Id: 1-396972311			Course	Full/Part Time	Affiliating Body	Intake 2010-11	Intake Approved for 11-12	NRI	PIO	Foreign Collaboration
Program	Shift	Level								
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	CIVIL ENGINEERING	FULL TIME	Anna University, Coimbatore	60	60	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	ELECTRICAL AND ELECTRONICS ENGINEERING	FULL TIME	Anna University, Coimbatore	60	60	No	No	No

Note: This is a Computer generated Extension of Approval Letter. No signature is required.

Date of printing: 03-09-2011

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Application Id: 1-396972311			Course	Full/Part Time	Affiliating Body	Intake 2010-11	Intake Approved for 11-12	NRI	PIO	Foreign Collaboration
Program	Shift	Level								
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	ELECTRONICS & COMMUNICATION ENGG	FULL TIME	Anna University, Coimbatore	120	120	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	INFORMATION TECHNOLOGY	FULL TIME	Anna University, Coimbatore	120	120	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	INSTRUMENTATION AND CONTROL ENGINEERING	FULL TIME	Anna University, Coimbatore	60	60	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	COMPUTER SCIENCE AND ENGINEERING	FULL TIME	Anna University, Coimbatore	120	120	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	AUTOMOBILE ENGINEERING	FULL TIME	Anna University, Coimbatore	60	60	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	MECHANICAL ENGINEERING	FULL TIME	Anna University, Coimbatore	90	90	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	POST GRADUATE	COMPUTER AND COMMUNICATION	FULL TIME	Anna University, Coimbatore	18	18	No	No	No

All India Council for Technical Education
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7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Application Id: 1-396972311			Course	Full/Part Time	Affiliating Body	Intake 2010-11	Intake Approved for 11-12	NRI	PIO	Foreign Collaboration
Program	Shift	Level								
ENGINEERING AND TECHNOLOGY	1st Shift	POST GRADUATE	STRUCTURAL ENGINEERING	FULL TIME	Anna University, Coimbatore	18	18	No	No	No
MCA	1st Shift	POST GRADUATE	MASTERS IN COMPUTER APPLICATIONS	FULL TIME	Anna University, Coimbatore	60	60	No	No	No

The above mentioned approval is subject to the condition that TAMILNADU COLLEGE OF ENGINEERING shall follow and adhere to the Regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

(Dr. K P Isaac)

Member Secretary, AICTE

Copy to:

1. **The Regional Officer,**
   All India Council for Technical Education
   Shastri Bhawan 26, Haddows Road
   Chennai - 600 006, Tamil Nadu
2. **The Director Of Technical Education,**
   Tamil Nadu
3. **The Registrar,**

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Anna University, Coimbatore

4. **The Principal / Director,**
TAMILNADU COLLEGE OF ENGINEERING
PALANISAME RAVI NAGAR
KARUMATHAMPATTI POST,
COIMBATORE,COIMBATORE,
Tamil Nadu,641659

5. **The Secretary / Chairman,**
TAMILNADU TECHNICAL EDUCATION FOUNDATION
PALANISWAMI RAVI NAGAR,KARYUMATHAMPATTI.POST,641659,
KARUMATHAMPATTI,COIMBATORE,
Tamil Nadu,641659

6. **Guard File(AICTE)**

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

F.No. Southern/1-699818871/2012/EOA

Date: 10 May 2012

To,
The Principal Secretary
(Higher Education) Govt. of Tamil Nadu,
N. K. M. Bld. 6th Floor Secretariat,
Chennai-600009

Sub: Extension of approval for the academic year 2012-13

Ref: Application of the Institution for Extension of approval for the academic year 2012-13

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2010 notified by the Council vide notification number F-No.37-3/Legal/2010 dated 10/12/2010 and amendment vide notification number F-No.37-3/Legal/2011 dated 30/09/2011 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Regional Office	Southern	Application Id	1-699818871
		Permanent Id	1-5104051
Name of the Institute	TAMILNADU COLLEGE OF ENGINEERING	Institute Address	PALANISAME RAVI NAGAR KARUMATHAMPATTI POST, COIMBATORE, COIMBATORE, Tamil Nadu, 641659
Name of the Society/Trust	TAMILNADU TECHNICAL EDUCATION FOUNDATION	Society/Trust Address	PALANISWAMI RAVI NAGAR,KARYUMATHAMPATTI.POST,641659,KARU MATHAMPATTI,COIMBATORE,Tamil Nadu,641659
Institute Type	Unaided - Private		

Opted for change from Women to Co-ed	No	Opted for change of name	No	Opted for change of site	No
Change from Women to Co-ed approved	Not Applicable	Change of name Approved	Not Applicable	Change of site Approved	Not Applicable

to conduct following courses with the intake indicated below for the academic year 2012-13

Note: This is a Computer generated Extension of Approval Letter. No signature is required.

Letter Printed On:17 May 2012.

Printed By : AE4342581

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Application Id: 1-699818871			Course	Full/Part Time	Affiliating Body	Intake 2011-12	Intake Approved for 12-13	NRI	PIO	Foreign Collaboration
Program	Shift	Level								
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	CIVIL ENGINEERING	FULL TIME	Anna University, Coimbatore	60	60	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	ELECTRICAL AND ELECTRONICS ENGINEERING	FULL TIME	Anna University, Coimbatore	60	60	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	ELECTRONICS & COMMUNICATION ENGG	FULL TIME	Anna University, Coimbatore	120	120	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	INFORMATION TECHNOLOGY	FULL TIME	Anna University, Coimbatore	120	120	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	INSTRUMENTATION AND CONTROL ENGINEERING	FULL TIME	Anna University, Coimbatore	60	60	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	COMPUTER SCIENCE AND ENGINEERING	FULL TIME	Anna University, Coimbatore	120	120	No	No	No

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

(Dr. K P Isaac)

Member Secretary, AICTE

Copy to:

1. **The Regional Officer,**
   All India Council for Technical Education
   Shastri Bhawan 26, Haddows Road
   Chennai - 600 006, Tamil Nadu
2. **The Director Of Technical Education,**
   Tamil Nadu
3. **The Registrar,**
   Anna University, Coimbatore
4. **The Principal / Director,**
   TAMILNADU COLLEGE OF ENGINEERING
   PALANISAME RAVI NAGAR
   KARUMATHAMPATTI POST,
   COIMBATORE,COIMBATORE,
   Tamil Nadu,641659
5. **The Secretary / Chairman,**
   TAMILNADU TECHNICAL EDUCATION FOUNDATION
   PALANISWAMI RAVI NAGAR,KARYUMATHAMPATTI.POST,641659,
   KARUMATHAMPATTI,COIMBATORE,
   Tamil Nadu,641659
6. **Guard File(AICTE)**

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

F.No. Southern/1-1360044818/2013/EOA

Date: 19-Mar-2013

To,
The Principal Secretary
(Higher Education) Govt. of Tamil Nadu,
N. K. M. Bld. 6th Floor Secretariat,
Chennai-600009

Sub: Extension of approval for the academic year 2013-14

Ref: Application of the Institution for Extension of approval for the academic year 2013-14

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2012 notified by the Council vide notification number F-No.37-3/Legal/2012 dated 27/09/2012 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Regional Office	Southern	Application Id	1-1360044818
		Permanent Id	1-5104051
Name of the Institute	TAMILNADU COLLEGE OF ENGINEERING	Institute Address	PALANISAME RAVI NAGAR KARUMATHAMPATTI POST, COIMBATORE, COIMBATORE, Tamil Nadu, 641659
Name of the Society/Trust	TAMILNADU TECHNICAL EDUCATION FOUNDATION	Society/Trust Address	PALANISWAMI RAVI NAGAR,KARYUMATHAMPATTI.POST,641659,KARU MATHAMPATTI,COIMBATORE,Tamil Nadu,641659
Institute Type	Unaided - Private		

Opted for change from Women to Co-ed	No	Opted for change of name	No	Opted for change of site	No
Change from Women to Co-ed approved	Not Applicable	Change of name Approved	Not Applicable	Change of site Approved	Not Applicable

to conduct following courses with the intake indicated below for the academic year 2013-14

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Application Id: 1-1360044818			Course	Full/Part Time	Affiliating Body	Intake 2012-13	Intake Approved for 13-14	NRI	PIO	Foreign Collaboration
Program	Shift	Level								
ENGINEERING AND TECHNOLOGY	1st Shift	POST GRADUATE	COMPUTER AND COMMUNICATION	FULL TIME	Anna University, Chennai	18	18	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	POST GRADUATE	STRUCTURAL ENGINEERING	FULL TIME	Anna University, Chennai	18	18	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	AUTOMOBILE ENGINEERING	FULL TIME	Anna University, Chennai	60	60	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	CIVIL ENGINEERING	FULL TIME	Anna University, Chennai	60	60	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	COMPUTER SCIENCE AND ENGINEERING	FULL TIME	Anna University, Chennai	120	120	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	ELECTRICAL AND ELECTRONICS ENGINEERING	FULL TIME	Anna University, Chennai	60	60	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	ELECTRONICS & COMMUNICATION ENGG	FULL TIME	Anna University, Chennai	120	120	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	INFORMATION TECHNOLOGY	FULL TIME	Anna University, Chennai	120	120	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	INSTRUMENTATION AND CONTROL ENGINEERING	FULL TIME	Anna University, Chennai	60	60	No	No	No

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Application Id: 1-1360044818			Course	Full/Part Time	Affiliating Body	Intake 2012-13	Intake Approved for 13-14	NRI	PIO	Foreign Collaboration
Program	Shift	Level								
ENGINEERING AND TECHNOLOGY	1st Shift	UNDER GRADUATE	MECHANICAL ENGINEERING	FULL TIME	Anna University, Chennai	90	90	No	No	No
MCA	1st Shift	POST GRADUATE	MASTERS IN COMPUTER APPLICATIONS	FULL TIME	Anna University, Chennai	60	60	No	No	No

- Validity of the course details may be verified at www.aicte-india.org>departments>approvals

The above mentioned approval is subject to the condition that TAMILNADU COLLEGE OF ENGINEERING shall follow and adhere to the Regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

(Dr. Kuncheria P. Isaac)

Member Secretary, AICTE

Copy to:

1. **The Regional Officer,**
   All India Council for Technical Education
   Shastri Bhawan 26, Haddows Road
   Chennai - 600 006, Tamil Nadu
2. **The Director Of Technical Education,**
   Tamil Nadu
3. **The Registrar,**

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Anna University, Chennai

4. **The Principal / Director,**
TAMILNADU COLLEGE OF ENGINEERING
PALANISAME RAVI NAGAR
KARUMATHAMPATTI POST,
COIMBATORE,COIMBATORE,
Tamil Nadu,641659

5. **The Secretary / Chairman,**
TAMILNADU TECHNICAL EDUCATION FOUNDATION
PALANISWAMI RAVI NAGAR,KARYUMATHAMPATTI.POST,641659,
KARUMATHAMPATTI,COIMBATORE,
Tamil Nadu,641659

6. **Guard File(AICTE)**

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2018-19

Extension of Approval (EoA)

F.No. Southern/1-3511334959/2018/EOA

Date: 04-Apr-2018

To,

The Principal Secretary
(Higher Education) Govt. of Tamil Nadu,
N. K. M. Bld. 6th Floor Secretariat,
Chennai-600009

Sub: Extension of Approval for the Academic Year 2018-19

Ref: Application of the Institution for Extension of approval for the Academic Year 2018-19

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2016 notified by the Council vide notification number F.No.AB/AICTE/REG/2016 dated 30/11/2016 and amended on December 5, 2017 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-5104051	**Application Id**	1-3511334959
Name of the Institute	TAMILNADU COLLEGE OF ENGINEERING	**Name of the Society/Trust**	TAMILNADU TECHNICAL EDUCATION FOUNDATION
Institute Address	PALANISAME RAVI NAGAR KARUMATHAMPATTI POST, COIMBATORE, COIMBATORE, Tamil Nadu, 641659	**Society/Trust Address**	PALANISWAMI RAVI NAGAR,KARYUMATHAMPATTI.POST,641659,KARUMATHAMPATTI,COIMBATORE,Tamil Nadu,641659
Institute Type	Unaided - Private	**Region**	Southern

Opted for Change from Women to Co-Ed and vice versa	No	**Change from Women to Co-Ed and vice versa Approved or Not**	NA
Opted for Change of Name	No	**Change of Name Approved or Not**	NA
Opted for Change of Site	No	**Change of Site Approved or Not**	NA
Opted for Conversion from Degree to Diploma or vice versa	No	**Conversion for Degree to Diploma or vice versa Approved or Not**	NA
Opted for Organization Name Change	No	**Change of Organization Name Approved or Not**	NA

To conduct following Courses with the Intake indicated below for the Academic Year 2018-19

Program	Shift	Level	Course	FT/PT+	Affiliating Body (Univ/Body)	Intake Approved for 2018-19	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status	Foreign Collaboration /Twining Program Approval Status*
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	CIVIL ENGINEERING	FT	Anna University, Chennai	60	NA	NA	NA
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	ELECTRICAL AND ELECTRONICS ENGINEERING	FT	Anna University, Chennai	60	NA	NA	NA
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	ELECTRONICS & COMMUNICATION ENGG	FT	Anna University, Chennai	120	NA	NA	NA
ENGINEERING	1st	UNDER	INFORMATION	FT	Anna University, Chennai	120	NA	NA	NA

AND TECHNOLOGY		GRADUATE	TECHNOLOGY						
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	INSTRUMENTATION AND CONTROL ENGINEERING	FT	Anna University, Chennai	60	NA	NA	NA
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	COMPUTER SCIENCE AND ENGINEERING	FT	Anna University, Chennai	120	NA	NA	NA
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	AUTOMOBILE ENGINEERING	FT	Anna University, Chennai	60	NA	NA	NA
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	MECHANICAL ENGINEERING	FT	Anna University, Chennai	90	NA	NA	NA
ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	COMPUTER SCIENCE AND ENGINEERING	FT	Anna University, Chennai	18	NA	NA	NA
ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	STRUCTURAL ENGINEERING	FT	Anna University, Chennai	18	NA	NA	NA
MCA	1st	POST GRADUATE	MASTERS IN COMPUTER APPLICATIONS	FT	Anna University, Chennai	60	NA	NA	NA

+FT –Full Time,PT-Part Time

Deficiencies Noted based on Self Disclosure

Particulars	Deficiency
Faculty Deficiency	Yes
Computational Facilities	
Internet Bandwidth	Yes
Internet Bandwidth-Applied Intake	Yes
Instructional Area- MCA	

*Please refer Deficiency Report for details

TAMILNADU COLLEGE OF ENGINEERING is hereby informed to submit the compliance of the deficiencies mentioned above to the Regional Office within a period of **6 months** from the date of issuance of this letter failing which the council shall initiate strict action as defined in Approval Process Handbook 2018-19 during the subsequent Academic Year.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Prof. A.P Mittal
Member Secretary, AICTE

Copy to:

1. The Regional Officer,
   All India Council for Technical Education
   Shastri Bhawan 26, Haddows Road
   Chennai - 600 006, Tamil Nadu
2. The Director Of Technical Education**,
   Tamil Nadu
3. The Registrar**,

Anna University, Chennai

4. The Principal / Director,
   TAMILNADU COLLEGE OF ENGINEERING
   PALANISAME RAVI NAGAR
   KARUMATHAMPATTI POST,
   COIMBATORE,COIMBATORE,
   Tamil Nadu,641659

5. The Secretary / Chairman,
   TAMILNADU TECHNICAL EDUCATION FOUNDATION
   PALANISWAMI RAVI NAGAR,KARYUMATHAMPATTI.POST,641659,
   KARUMATHAMPATTI,COIMBATORE,
   Tamil Nadu,641659

6. Guard File(AICTE)

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2019-20

Extension of Approval (EoA)

F.No. Southern/1-4260332410/2019/EOA

Date: 29-Apr-2019

To,

The Principal Secretary
(Higher Education) Govt. of Tamil Nadu,
N. K. M. Bld. 6th Floor Secretariat,
Chennai-600009

Sub: Extension of Approval for the Academic Year 2019-20

Ref: Application of the Institution for Extension of approval for the Academic Year 2019-20

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2018 notified by the Council vide notification number F.No.AB/AICTE/REG/2018 dated 31/12/2018 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-5104051	**Application Id**	1-4260332410
Name of the Institute	TAMILNADU COLLEGE OF ENGINEERING	**Name of the Society/Trust**	TAMILNADU TECHNICAL EDUCATION FOUNDATION
Institute Address	PALANISAME RAVI NAGAR KARUMATHAMPATTI POST, COIMBATORE, COIMBATORE, Tamil Nadu, 641659	**Society/Trust Address**	PALANISWAMI RAVI NAGAR,KARYUMATHAMPATTI.POST,641659,KARUMATHAMPATTI,COIMBATORE,Tamil Nadu,641659
Institute Type	Unaided - Private	**Region**	Southern

Opted for Change from Women to Co-Ed and vice versa	No	**Change from Women to Co-Ed and vice versa Approved or Not**	NA
Opted for Change of Name	No	**Change of Name Approved or Not**	NA
Opted for Change of Site/Location	No	**Change of Site/Location Approved or Not**	NA
Opted for Conversion from Degree to Diploma or vice versa	No	**Conversion for Degree to Diploma or vice versa Approved or Not**	NA
Opted for Organization Name Change	No	**Change of Organization Name Approved or Not**	NA
Opted for Merger of Institution	No	**Merger of Institution Approved or Not**	NA
Opted for Introduction of New Program/Level	No	**Introduction of Program/Level Approved or Not**	NA

To conduct following Courses with the Intake indicated below for the Academic Year 2019-20

Program	Shift	Level	Course	FT/PT+	Affiliating Body (Univ/Body)	Intake Approved for 2019-20	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	CIVIL ENGINEERING	FT	Anna University, Chennai	60	NA	NA
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	ELECTRICAL AND	FT	Anna University, Chennai	60	NA	NA

			ELECTRONICS ENGINEERING					
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	ELECTRONICS & COMMUNICATION ENGG	FT	Anna University, Chennai	60	NA	NA
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	INFORMATION TECHNOLOGY	FT	Anna University, Chennai	0#	NA	NA
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	INSTRUMENTATION AND CONTROL ENGINEERING	FT	Anna University, Chennai	60	NA	NA
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	COMPUTER SCIENCE AND ENGINEERING	FT	Anna University, Chennai	60	NA	NA
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	AUTOMOBILE ENGINEERING	FT	Anna University, Chennai	60	NA	NA
ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	MECHANICAL ENGINEERING	FT	Anna University, Chennai	90	NA	NA
ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	COMPUTER SCIENCE AND ENGINEERING	FT	Anna University, Chennai	18	NA	NA
ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	STRUCTURAL ENGINEERING	FT	Anna University, Chennai	18	NA	NA
MCA	1st	POST GRADUATE	MASTERS IN COMPUTER APPLICATIONS	FT	Anna University, Chennai	30	NA	NA

+FT –Full Time,PT-Part Time

Punitive Action against the Institute

Deficiencies Noted based on Self Disclosure	
Particulars	**Deficiency**
Faculty Deficiency	Yes

*Please refer Deficiency Report for details

TAMILNADU COLLEGE OF ENGINEERING is hereby informed to submit the compliance of the deficiencies mentioned above to the Regional Office within a period of **6 months** from the date of issuance of this letter failing which the council shall initiate strict action as defined in Approval Process Handbook 2019-20 during the subsequent Academic Year.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

It is mandatory to comply all the essential requirements as given in APH 2019-20(appendix 6)

NOTE: If the State Government / UT / DTE / DME has a reservation policy for admission in Technical Education Institutes and the same is applicable to Private & Self-financing Technical Institutions, then the State Government / UT/ DTE / DME shall ensure that 10 % of Reservation for EWS would be operational from the Academic year 2019-20 without affecting the percentage reservations of SC/ST/OBC/General . However, this would not be applicable in the case of Minority Institutions referred to the clause (1) of Article 30 of Constitution of India.

Prof. A.P Mittal
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Tamil Nadu**

2. **The Registrar**,**
   Anna University, Chennai

3. **The Principal / Director,**
   Tamilnadu College Of Engineering
   Palanisame Ravi Nagar
   Karumathampatti Post,
   Coimbatore,Coimbatore,
   Tamil Nadu,641659

4. **The Secretary / Chairman,**
   Tamilnadu Technical Education Foundation
   Palaniswami Ravi Nagar,Karyumathampatti.Post,641659.
   Karumathampatti,Coimbatore,
   Tamil Nadu,641659

5. **The Regional Officer,**
   All India Council for Technical Education
   Shastri Bhawan 26, Haddows Road
   Chennai - 600 006, Tamil Nadu

6. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2019-20

Extension of Approval (EoA)

F.No. Southern/1-4263331524/2019/EOA

Date: 10-Apr-2019

To,

The Principal Secretary
(Higher Education) Govt. of Tamil Nadu,
N. K. M. Bld. 6th Floor Secretariat,
Chennai-600009

Sub: Extension of Approval for the Academic Year 2019-20

Ref: Application of the Institution for Extension of approval for the Academic Year 2019-20

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2018 notified by the Council vide notification number F.No.AB/AICTE/REG/2018 dated 31/12/2018 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-6906351	**Application Id**	1-4263331524
Name of the Institute	TAMILNADU COLLEGE OF ENGINEERING	**Name of the Society/Trust**	TAMILNADU TECHNICAL EDUCATION FOUNDATION
Institute Address	PALANISAME RAVI NAGAR KARUMATHAMPATTI COIMBATORE TAMILNADU PIN CODE: 641 659, COIMBATORE, COIMBATORE, Tamil Nadu, 641659	**Society/Trust Address**	PALANISAMY RAVI NAGAR, KARUMATHAMPATTI, COIMBATORE - 641659,COIMBATORE,COIMBATORE,Tamil Nadu,641659
Institute Type	Unaided - Private	**Region**	Southern

Opted for Change from Women to Co-Ed and vice versa	No	**Change from Women to Co-Ed and vice versa Approved or Not**	NA
Opted for Change of Name	No	**Change of Name Approved or Not**	NA
Opted for Change of Site/Location	No	**Change of Site/Location Approved or Not**	NA
Opted for Conversion from Degree to Diploma or vice versa	No	**Conversion for Degree to Diploma or vice versa Approved or Not**	NA
Opted for Organization Name Change	No	**Change of Organization Name Approved or Not**	NA
Opted for Merger of Institution	No	**Merger of Institution Approved or Not**	NA
Opted for Introduction of New Program/Level	No	**Introduction of Program/Level Approved or Not**	NA

To conduct following Courses with the Intake indicated below for the Academic Year 2019-20

Program	Shift	Level	Course	FT/PT+	Affiliating Body (Univ/Body)	Intake Approved for 2019-20	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status
Management	1st	POST GRADUATE	Masters In Business Administration	FT	Anna University, Chennai	60	NA	NA

+FT –Full Time,PT-Part Time

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

It is mandatory to comply all the essential requirements as given in APH 2019-20(appendix 6)

NOTE: If the State Government / UT / DTE / DME has a reservation policy for admission in Technical Education Institutes and the same is applicable to Private & Self-financing Technical Institutions, then the State Government / UT/ DTE / DME shall ensure that 10 % of Reservation for EWS would be operational from the Academic year 2019-20 without affecting the percentage reservations of SC/ST/OBC/General . However, this would not be applicable in the case of Minority Institutions referred to the clause (1) of Article 30 of Constitution of India.

Prof. A.P Mittal
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Tamil Nadu**

2. **The Registrar**,**
   Anna University, Chennai

3. **The Principal / Director,**
   Tamilnadu College Of Engineering
   Palanisame Ravi Nagar
   Karumathampatti
   Coimbatore
   Tamilnadu
   Pin Code: 641 659,
   Coimbatore,Coimbatore,
   Tamil Nadu,641659

4. **The Secretary / Chairman,**
   Tamilnadu Technical Education Foundation
   Palanisamy Ravi Nagar,

   Karumathampatti,
   Coimbatore -641659.
   Coimbatore,Coimbatore,
   Tamil Nadu,641659

5. **The Regional Officer,**
   All India Council for Technical Education
   Shastri Bhawan 26, Haddows Road
   Chennai - 600 006, Tamil Nadu

6. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2020-21

Extension of Approval (EoA)

F.No. Southern/1-7001782960/2020/EOA Date: 30-Apr-2020

To,

The Principal Secretary
(Higher Education) Govt. of Tamil Nadu,
N. K. M. Bld. 6th Floor Secretariat,
Chennai-600009

Sub: Extension of Approval for the Academic Year 2020-21

Ref: Application of the Institution for Extension of Approval for the Academic Year 2020-21

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2020 notified by the Council vide notification number F.No. AB/AICTE/REG/2020 dated 4th February 2020 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-6906351	**Application Id**	1-7001782960
Name of the Institute	TAMILNADU COLLEGE OF ENGINEERING	**Name of the Society/Trust**	TAMILNADU TECHNICAL EDUCATION FOUNDATION
Institute Address	PALANISAME RAVI NAGAR KARUMATHAMPATTI COIMBATORE TAMILNADU PIN CODE: 641 659, COIMBATORE, COIMBATORE, Tamil Nadu, 641659	**Society/Trust Address**	PALANISAMY RAVI NAGAR, KARUMATHAMPATTI, COIMBATORE - 641659,COIMBATORE,COIMBATORE,,641659
Institute Type	Private-Self Financing	**Region**	Southern

To conduct following Courses with the Intake indicated below for the Academic Year 2020-21

Program	Level	Course	Affiliating Body (University /Body)	Intake Approved for 2019-20	Intake Approved for 2020-21	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status
MANAGEMENT	POST GRADUATE	MBA	Anna University, Chennai	60	30	NA	No

It is mandatory to comply with all the essential requirements as given in APH 2020-21 (Appendix 6)

Important Instructions

1. The State Government/ UT/ Directorate of Technical Education/ Directorate of Medical Education shall ensure that 10% of reservation for Economically Weaker Section (EWS) as per the reservation policy for admission, operational from the Academic year 2020-21 is implemented without affecting the reservation percentages of SC/ ST/ OBC/ General. However, this would not be applicable in the case of Minority Institutions referred to the Clause (1) of Article 30 of Constitution of India. Such Institution shall be permitted to increase in annual permitted strength over a maximum period of two years beginning with the Academic Year 2020-21

2. The Institution offering courses earlier in the Regular Shift, First Shift, Second Shift/Part Time now amalgamated as total intake shall have to fulfil all facilities such as Infrastructure, Faculty and other requirements as per the norms specified in the Approval Process Handbook 2020-21 for the Total Approved Intake. Further, the Institutions Deemed to be Universities/ Institutions having Accreditation/ Autonomy status shall have to maintain the Faculty: Student ratio as specified in the Approval Process Handbook. All such Institutions/ Universities shall have to create the necessary Faculty, Infrastructure and other facilities WITHIN 2 YEARS to fulfil the norms based on the Affidavit submitted to AICTE.

3. In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

4. Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 373/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Prof.Rajive Kumar
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Tamil Nadu**

2. **The Registrar**,**
   Anna University, Chennai

3. **The Principal / Director,**
   TAMILNADU COLLEGE OF ENGINEERING
   Palanisame Ravi Nagar
   Karumathampatti
   Coimbatore
   Tamilnadu
   Pin Code: 641 659,
   Coimbatore,Coimbatore,
   Tamil Nadu,641659

4. **The Secretary / Chairman,**
   PALANISAMY RAVI NAGAR,

   KARUMATHAMPATTI,
   COIMBATORE -641659
   COIMBATORE,COIMBATORE
   ,641659

5. **The Regional Officer,**
   All India Council for Technical Education
   Shastri Bhawan 26, Haddows Road
   Chennai - 600 006, Tamil Nadu

6. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

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All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2020-21

Extension of Approval (EoA)

F.No. Southern/1-7013685780/2020/EOA Date: 15-Jun-2020

To,

The Principal Secretary
(Higher Education) Govt. of Tamil Nadu,
N. K. M. Bld. 6th Floor Secretariat,
Chennai-600009

Sub: Extension of Approval for the Academic Year 2020-21

Ref: Application of the Institution for Extension of Approval for the Academic Year 2020-21

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2020 notified by the Council vide notification number F.No. AB/AICTE/REG/2020 dated 4th February 2020 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-5104051	**Application Id**	1-7013685780
Name of the Institute	TAMILNADU COLLEGE OF ENGINEERING	**Name of the Society/Trust**	TAMILNADU TECHNICAL EDUCATION FOUNDATION
Institute Address	PALANISAME RAVI NAGAR KARUMATHAMPATTI POST, COIMBATORE, COIMBATORE, Tamil Nadu, 641659	**Society/Trust Address**	PALANISWAMI RAVI NAGAR,KARYUMATHAMPATTI.POST,641659,KARUMATHAMPATTI,COIMBATORE,Tamil Nadu,641659
Institute Type	Private-Self Financing	**Region**	Southern

To conduct following Courses with the Intake indicated below for the Academic Year 2020-21

Program	Level	Course	Affiliating Body (University /Body)	Intake Approved for 2019-20	Intake Approved for 2020-21	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	CIVIL ENGINEERING	Anna University, Chennai	60	30	NA	NA
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	ELECTRICAL AND ELECTRONICS ENGINEERING	Anna University, Chennai	60	30	NA	NA
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	ELECTRONICS & COMMUNICATION ENGG	Anna University, Chennai	60	60	NA	NA

ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	INSTRUMENTATION AND CONTROL ENGINEERING	Anna University, Chennai	60	30	NA	NA
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	COMPUTER SCIENCE AND ENGINEERING	Anna University, Chennai	60	60	NA	NA
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	AUTOMOBILE ENGINEERING	Anna University, Chennai	60	30	NA	NA
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	MECHANICAL ENGINEERING	Anna University, Chennai	90	60	NA	NA
ENGINEERING AND TECHNOLOGY	POST GRADUATE	COMPUTER SCIENCE AND ENGINEERING	Anna University, Chennai	18	9	NA	NA
ENGINEERING AND TECHNOLOGY	POST GRADUATE	STRUCTURAL ENGINEERING	Anna University, Chennai	18	18	NA	NA

Course(s) Applied for Closure by the Institute for the Academic Year 2020-21

Program	Level	Course	Affiliating Body (Univ/Body)	Course Closure Status
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	INFORMATION TECHNOLOGY	Anna University, Chennai	Approved

It is mandatory to comply with all the essential requirements as given in APH 2020-21 (Appendix 6)

Important Instructions

1. The State Government/ UT/ Directorate of Technical Education/ Directorate of Medical Education shall ensure that 10% of reservation for Economically Weaker Section (EWS) as per the reservation policy for admission, operational from the Academic year 2020-21 is implemented without affecting the reservation percentages of SC/ ST/ OBC/ General. However, this would not be applicable in the case of Minority Institutions referred to the Clause (1) of Article 30 of Constitution of India. Such Institution shall be permitted to increase in annual permitted strength over a maximum period of two years beginning with the Academic Year 2020-21

2. The Institution offering courses earlier in the Regular Shift, First Shift, Second Shift/Part Time now amalgamated as total intake shall have to fulfil all facilities such as Infrastructure, Faculty and other requirements as per the norms specified in the Approval Process Handbook 2020-21 for the Total Approved Intake. Further, the Institutions Deemed to be Universities/ Institutions having Accreditation/ Autonomy status shall have to maintain the Faculty: Student ratio as specified in the Approval Process Handbook. All such Institutions/

Universities shall have to create the necessary Faculty, Infrastructure and other facilities WITHIN 2 YEARS to fulfil the norms based on the Affidavit submitted to AICTE.

3. In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

4. Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 373/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Prof.Rajive Kumar
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Tamil Nadu**

2. **The Registrar**,**
   Anna University, Chennai

3. **The Principal / Director,**
   TAMILNADU COLLEGE OF ENGINEERING
   Palanisame Ravi Nagar
   Karumathampatti Post,
   Coimbatore,Coimbatore,
   Tamil Nadu,641659

4. **The Secretary / Chairman,**
   PALANISWAMI RAVI NAGAR,KARYUMATHAMPATTI.POST,641659
   KARUMATHAMPATTI,COIMBATORE
   Tamil Nadu,641659

5. **The Regional Officer,**
   All India Council for Technical Education
   Shastri Bhawan 26, Haddows Road
   Chennai - 600 006, Tamil Nadu

6. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

20. Best Practices adopted, if any

The goal of this practice is to appreciate the work done by the teaching staff, non-teaching staff and students of the institute and motivate them to excel in their areas of expertise.

1.Mentoring is done effectively by assigning a mentor (facilitator) to each student. Mentoring gives opportunity to share the difficulties & problems to get professional help and guidance by building trust and confidence. Periodic reports are generated by the faculty

2.Additional coaching for slow learners through remedial classes, Involvement of industrial personnel for additional study sessions in and off the classroom

3.Internal quality audit for question paper setting and assessment, internal academic audit conducted after every internal assessment exam to monitor, and to assess planning, delivery, evaluation, and attainment levels for every course, and improve the quality of teaching-learning process through counseling and appreciations.

4.Student feedback on organization, assessment, and delivery of course contents, counseling and guidance, twice a year to rate course teacher individually and relatively with other course teachers of that class thereby providing an opportunity for teachers to address their strength/s and weakness/es.

5.Promoting the students for their involvement in co-curricular activities within and outside the campus

6.Industrial training and internship since second year of UG program

7.Conducting guest lectures, workshops and seminars to encourage higher education within and outside the country

8.With a view to promote curriculum and extra-curriculum activities the Institute has various clubs operating like IOT Club, Robotic Club, Literature Club, Tamil Mandram, Sports Club etc., which go in a long way to boost the innovative and creative mind frame of our students.

The college engages industrial visits to acquaint the students with practical and basic engineering knowledge every year.

The college conducts blood donation camp to boost the social awareness and ethical duty as human being

The college has launched Alumni Portal to connect with the alumni and utilize their services, like Guest Lectures, Internship opportunities, placements, etc.,

Best Teacher Award:

Faculty evaluation scheme called Performance Based Appraisal System is implemented in the institute. The PBAS consist of 1000 marks, and the teacher who scores the maximum marks is rewarded as Best Teacher of the institute.