J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

(Permanently Affiliated to JNTUH, Approved by AICTE, New Delhi and Accredited by NBA, NAAC)

Bhaskar nagar, Moinabad Mandal, R.R. District,
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ACADEMIC REGULATIONS (JBIET R-14), COURSE STRUCTURE AND SYLLABI FOR B. TECH

B.Tech. Regular Four Year Degree Programme
(For the batches admitted from the Academic Year 2014 - 2015)

&

B.Tech. (Lateral Entry Scheme)
(For the batches admitted from the Academic Year 2015 - 2016)

Note: The regulations hereunder are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already pursuing the program) as may be decided by the Academic Council of JBIET.

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ACADEMIC REGULATIONS- R14 FOR B. TECH. (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2014-15 and onwards

1. Award of B. Tech. Degree

A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:

1.1 The candidate shall pursue a course of study for not less than four academic years and not more than eight academic years(i.e. No student is allowed to have more than four times detention)

1.2 After eight academic years of course of study, the candidate is permitted to write the examinations for two more years.

1.3 The candidate shall register for 213 credits and secure 206 credits with compulsory subjects as listed in Table-1.

Table-1	
Serial Number	Subject Particulars
1	All practical subjects
2	Industry oriented mini project
3	Comprehensive Assignment
4	Industrial Internship
5	Comprehensive Viva-Voce
6	Seminar
7	Project work

2. Forfeiting B.Tech Degree

The students, who fail to fulfill all the academic requirements for the award of the degree within ten academic years from the year of their admission, shall forfeit their seats in B. Tech. course.

3. Courses of study

The following courses of study are offered at present as specializations for the B. Tech. Course:

Branch Code	Branch
01	Civil Engineering
02	Electrical and Electronics Engineering
03	Mechanical Engineering
04	Electronics and Communication Engineering
05	Computer Science and Engineering
12	Information Technology
19	Electronics and Computer Engineering
25	Mining Engineering

4. Credits

Each course is normally assigned a certain number of credits as follows:

	Semester	
	Periods /Week	**Credits**
Theory	04+1*/4	04
	03+1*/3	03
Practical	03	02
Drawing	01+03	03
Mini Project	--	02
Comprehensive Assignment	-	02
Industrial Internship	-	02
Comprehensive Viva Voce	--	02
Seminar	6	02
Project	15	10

*Tutorial

5. Distributions and Weightage of Marks

5.1 The performance of a student in each semester shall be evaluated subject-wise for a maximum of 100 marks for a theory and 75 marks for a practical subject. In addition, industry-oriented mini-project, Comprehensive Assignment, Industrial Internship, seminar, Comprehensive viva and project work shall be evaluated for 50, 50, 50, 50, 100 and 200

marks, respectively.

5.2 For theory subjects the distribution shall be 25 marks for Internal Evaluation and 75 marks for the End-Examination.

5.3 For theory subjects, during a semester there shall be 2 mid-term examinations. Each mid-term examination consists of 2 parts. Part-A contains objective and Part-B contains descriptive questions and assignment. The Part-A and Part-B shall be for 10 marks each with a total duration of 1 hour 20 minutes. The Part-A is set with 20 bits of multiple choice, fill-in the blanks and matching type of questions for a total of 10 marks. The Part-B shall contain 4 full questions (two from each unit for first mid and minimum one from each unit in the second mid) out of which, the student has to answer 2 questions, each carrying 5 marks. While the first mid-term examination shall be conducted in first Two Units of the syllabus, the second mid-term examination shall be conducted in last Three Units. Five (5) marks are allocated for Assignments (as specified by the subject teacher concerned). The first Assignment should be submitted before the conduct of the first mid-examination, and the second Assignment should be submitted before the conduct of the second mid-examination. The total marks secured by the student in each mid-term examination are evaluated for 25 marks, and the average of the two mid-term examinations shall be taken as the final marks secured by each candidate. . If any candidate is absent from any subject of a mid-term examination with a valid reason (only medical reasons are allowed), re-examination will be conducted for such student.

The details of End Examination Question Paper pattern is as follows:

The End semesters Examination will be conducted for 75 marks which consist of two parts viz. i). Part-A for 25 marks, ii). Part –B for 50 marks

Part -A is compulsory question which consists of Five questions, one from each unit and carries 5 marks each.

Part-B consists of five Questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice (that means there will be two questions from each unit and the student should answer any one question)

5.4 For practical subjects there shall be a continuous evaluation during a semester for 25 sessional marks and 50 end semester examination marks. Out of the 25 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned. The end semester examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the other colleges which are decided by the examination branch of JBIET.

5.5 For the subject having design and/or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and Estimation, the distribution shall be 25 marks for internal

evaluation (15 marks for day-to-day work and 10 marks for internal tests) and 75 marks for end semester examination. There shall be two internal tests in a Semester and the average of the two shall be considered for the award of marks for internal tests.

5.6 There shall be Science based Mini-Project, to be taken up during the vacation after I year II Semester examination for regular students, after II year I Semester for Lateral Entry students and it will be evaluated in II Year II semester. However, the Science based mini-project marks will be added in II year II Semester. The Comprehensive Assignment shall be submitted in a report form and presented before the committee. It shall be evaluated for 50 marks. The committee consists of head of the department, and the supervisor of the Comprehensive Assignment and a senior faculty member of the department. There shall be no external marks for Comprehensive Assignment.

5.7 As per the direction from the state Government a New Course _Gender Sensitization' has been introduced for B.Tech 2-2 Students who are studying under JBIET R14 regulation.

This is a compulsory Subject and posses _2' Credits. It should be treated as a lab subject with two credits from the academic Year 2015-2016.

5.8 There shall be an Industrial internship, in collaboration with an industry of their specialization, to be taken up during the vacation after II year II Semester examination and it will be evaluated in III Year II semester. The Industrial internship report shall be submitted in a report form and presented before the committee. It shall be evaluated for 50 marks. The committee consists of head of the department, and internship supervisor and a senior faculty member of the department. There shall be no external marks for internship.

5.9 There shall be an industry-oriented Mini-Project, in collaboration with an industry of their specialization, to be taken up during the vacation after III year II Semester examination. However, the mini-project and its report shall be evaluated along with the project work in IV year II Semester. The industry oriented mini-project shall be submitted in a report form and presented before the committee. It shall be evaluated for 50 marks. The committee consists of an external examiner, head of the department, the supervisor of the mini-project and a senior faculty member of the department. There shall be no internal marks for industry-oriented mini-project.

5.10 There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding of the topic, and submit it to the department. It shall be evaluated by the departmental committee consisting of head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for the seminar.

5.11 There shall be a Comprehensive Viva-Voce in IV year II semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive Viva-Voce is intended to assess the student‘s understanding of the subjects he studied during the B.

Tech. course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce.

5.12 Out of a total of 200 marks for the project work, 50 marks shall be allotted for Internal Evaluation and 150 marks for the End Semester Examination (50 marks for thesis, 50 marks for successful execution of the project and 50 marks for Viva Voce). The End Semester Examination of the project work shall be conducted by the same committee as appointed for the industry-oriented mini-project. In addition, the project supervisor shall also be included in the committee. The topics for Comprehensive Assignment, Industrial Internship, industry oriented mini project, and seminar and project work shall be different from one another. The evaluation of project work shall be made at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project.

5.13 The Laboratory marks and the sessional marks awarded by the examiners are subject to scrutiny and scaling by the college wherever necessary. In such cases, the sessional and laboratory marks awarded by the examiners will be referred to a Committee. The Committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the Committee will be final and binding. The laboratory records and internal test papers shall be preserved and should be produced before the Committees as and when required.

6. Attendance Requirements

6.1 A student is eligible to write the End Semester examinations only if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

6.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee

6.3 Shortage of Attendance below 65% in aggregate shall not be condoned and student will be detained on account of shortage of attendance below 65%.

6.4 A student who is short of attendance in semester may seek re-admission into that semester when offered within 4 weeks from the date of the commencement of class work.

6.5 Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class and their registration stands cancelled.

6.6 A stipulated fee shall be payable towards condonation of shortage of attendance.

6.7 A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester, as applicable, including the days of attendance in sports, games, NCC and NSS activities.

6.8 If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

7. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6.

7.1 A student is deemed to have satisfied the minimum academic requirements if he/she has earned the credits allotted to each theory/practical design/drawing subject/project and secures not less than 35% of marks in the end semester exam, and minimum 40% of marks in the sum total of the mid-term and end semester exams.

7.2 A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement.

7.3 A student will not be promoted from II year to III year unless he fulfills the academic requirement of 40 credits up to II year II semester or 30 credits up to II year I semester from all the examinations, whether or not the candidate takes the examinations.

7.4 A student shall be promoted from III year to IV year only if he fulfils the academic requirements of 60 credits up to III year II semester or 50 credits up to III year I semester from all the examinations, whether or not the candidate takes the examinations.

7.5 A student shall register and put up minimum attendance in all 213 credits and earn 206 credits. Marks obtained in the best 204 credits shall be considered for the calculation of percentage of marks.

7.6 Students who fail to earn 206 credits as indicated in the course structure within ten academic years (8 years of study + 2 years additionally for appearing for exams only) from the year of their admission, shall forfeit their seat in B.Tech. Course and their admission stands cancelled.

8 Course Pattern

8.1 The entire course of study is for four academic years. I , II, III and IV years shall be on semester pattern.

8.2 A student, eligible to appear for the end examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject during the period of supplementary exams.

8.3 When a student is detained for lack of credits/shortage of attendance, he may be re-admitted into the next semester. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

9 Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	% of marks to be secured	From the aggregate marks secured from 204 Credits.
First Class with Distinction	70% and above	
First Class	Below 70 but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

The marks obtained in internal evaluation and end semester examination shall be shown separately in the memorandum of marks.

10 Minimum Instruction Days

The minimum instruction days for each semester shall be 90 days. Tentatative Schedule must be as per the pattern given below.

First Semester	Instructions Days	16 Weeks
	Mid Term Examinations	2 Weeks
	Preparation & Practical Examinations	2Weeks
	End Examinations	2Weeks
Semester Break		2Weeks
Second Semester	Instructions Days	16 Weeks
	Mid Term Examinations	2 Weeks
	Preparation & Practical Examinations	2Weeks
	End Examinations	2Weeks
Summer Break		6 weeks

11. Branch Transfer of students

There shall be no branch transfers after the completion of the admission process.

12. Transfer of students from other colleges/universities

Transfer of students from the Constituent Colleges of *JNTUH* or from other Colleges/Universities shall be considered only on a case-to-case basis by the Academic Council of the Institute while following rules as in the force at that time promulgated by JNTUH and State government of Telangana.

13. Withholding Of Results

If the student has not paid the dues, if any, to the college or if any case of indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester. His degree will be withheld in such cases.

14. Transitory regulations

14.1 Discontinued, detained, or failed candidates are eligible for readmission, as and when next offered.

14.2 After the revision of the regulations, the students of the previous batches will be given two chances for passing in their failed subjects, one supplementary and the other regular. If the students cannot clear the subjects in the given two chances, they shall be given equivalent subjects as per the revised regulations which they have to pass in order to obtain the required number of credits.

14.3 In case of transferred students from other Universities and colleges, the credits shall be transferred to JBIET as per the academic regulations and course structure of the JBIET.

15. General

15.1 Wherever the words ―he‖, ―him‖, ―his‖, occur in the regulations, they include ―she‖, ―her‖, ―hers‖.

15.2 The academic regulation should be read as a whole for the purpose of any interpretation.

15.3 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

15.4 The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the College.

15.5 The students seeking transfer to JBIET from various other Universities/ Institutions have to pass the failed subjects which are equivalent to the subjects of JBIET, and also pass the subjects of JBIET which the candidates have not studied at the earlier Institution on their own without the right to sessional marks. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of JBIET, the candidates have to study those subjects in JBIET in spite of the fact that those subjects are repeated.

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ACADEMIC REGULATIONS R14 FOR B. TECH. (LATERAL ENTRY SCHEME)

Applicable for the students admitted into II year B. Tech. (LES) from the Academic Year 2014-15 and onwards

1 Eligibility for award of B. Tech. Degree (LES)

1.1 The LES candidates shall pursue a course of study for not less than three academic years and not more than six academic years.

1.2 They shall be permitted to write the examinations for two more years after six academic years of course work.

1.3 The candidate shall register for 163 credits and secure 156 credits from II to IV year B.Tech. Program (LES) for the award of B.Tech. degree with compulsory subjects as listed in Table-2.

Table-2	
Serial Number	Subject Particulars
1	All practical subjects
2	Industry oriented mini project
3	Comprehensive Assignment
4	Industrial Internship
5	Comprehensive Viva-Voce
6	Seminar
7	Project work

1.4 The students, who fail to fulfil the requirement for the award of the degree in 8 consecutive academic years (6 years of study + 2 years additionally for appearing exams only) from the year of admission, shall forfeit their seats.

1.5 The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

2. Promotion Rule

A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.

A student shall be promoted from III year to IV year only if he fulfils the academic requirements of 40 credits up to III year II semester or 30 credits up to III year I semester from all the examinations, whether or not the candidate takes the examinations.

3. Award of Class

After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured for 154 Credits. (i.e. II year to IV year)
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

The marks obtained in the internal evaluation and the end semester examination shall be shown separately in the marks memorandum.

4. All other regulations as applicable to **B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)**.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	**Punishment**
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that Subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and kept with the examination branch.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated,

		shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all End semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all End semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the

	or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all End semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the Examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the

		subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for invigilators : (if the squad reports that the invigilator is also involved in encouraging malpractices)
   (i) A show cause notice shall be issued to the invigilator.
   (ii) Impose a suitable fine on the invigilator.

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ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE STRUCTURE – R14

I B.Tech – I Semester

Sl. No	Code		L	T-P-D	C
1	C110A	English	3	0-0-0	3
2	C110B	Mathematics - I	4	1-0-0	4
3	C110C	Engineering Physics	3	1-0-0	3
4	C115A	Computer Programming	3	1-0-0	3
5	C113B	Engineering Drawing - I	1	0-0-3	3
6	C1101	Computer Programming Lab	0	0-3-0	2
7	C1102	Engineering Physics Lab	0	0-3-0	2
8	C1104	Engineering Workshop	0	0-3-0	2
9	C1105	English Lab	0	0-3-0	2
		Total	**14**	**3-12-3**	**24**

I B.Tech – II Semester

Sl. No	Code	Subject	L	T-P-D	C
1	C120A	Technical English	3	0-0-0	3
2	C120B	Mathematics - II	4	1-0-0	4
3	C120E	Mathematical Methods	4	1-0-0	4
4	C120D	Engineering Chemistry	3	0-0-0	3
5	C125A	Data Structure	3	1-0-0	3
6	C120F	Professional Ethics	3	0-0-0	3
7	C1201	Data Structure Lab.	0	0-3-0	2
8	C1203	Engineering Chemistry Lab.	0	0-3-0	2
9	C1204	IT Workshop	0	0-3-0	2
		Total	**20**	**3-9-0**	**26**

II B.Tech – I Semester

Sl. No	Code	Subject	L	T-P-D	C
1	C210D	Complex Analysis	3	1-0-0	3
2	C212A	Network Theory – I	4	1-0-0	4
3	C210B	Environmental studies	3	0-0-0	3
4	C214C	Electronic Devices and Circuits	4	0-0-0	4
5	C212G	Electro Magnetic Field Theory	3	0-0-0	3
6	C212D	Electrical Machines – I	4	1-0-0	4
7	C2104	Electrical Machines – I Lab	0	0-3-0	2
8	C2105	Electronic Devices and Circuits Lab	0	0-3-0	2
9	C2106	Electrical Simulation Lab - 1	0	0-3-0	2
		Total	**21**	**3-9-0**	**27**

II B.Tech – II Semester

Sl. No	Code	Subject	L	T-P-D	C
1	C224C	Switching Theory and Logic Design	3	1-0-0	3
2	C222A	Electrical Machines – II	4	0-0-0	4
3	C222B	Network Theory – II	4	1-0-0	4
4	C222C	Power Systems - I	3	1-0-0	3
5	C223D	Mechanics of Fluids And Hydraulic Machines	4	0-0-0	4
6	C2205	Electrical Circuits Lab	0	0-3-0	2
7	C2206	Electrical Simulation Lab - II	0	0-3-0	2
8	C2207	Electrical Machines – II Lab	0	0-3-0	2
9	C2208	Comprehensive Assignment	0	0-0-0	2
10	C2209	Gender Sensitization	0	0-3-0	2
		Total	**18**	**3-12-0**	**28**

III B.Tech – I Semester

Sl. No	Code	Subject	L	T-P-D	C
1	C312A	Electrical Machines – III	3	1-0-0	3
2	C312B	Control Systems	3	1-0-0	3
3	C312C	Power Systems - II	4	1-0-0	4
4	C312D	Power Electronics	4	0-0-0	4
5	C314D	IC Applications	4	0-0-0	4
6	**OPEN ELECTIVE:**		3	0-0-0	3
	C312O	Renewable Energy Sources			
	C316O	Intellectual Property Rights			
	C315P	Cyber security			
7	C3103	Mechanics of Fluids And Hydraulic Machines Lab	0	0-3-0	2
8	C3104	Control Systems & Simulation Lab	0	0-3-0	2
9	C3105	Synchronous Machines & Simulation Lab	0	0-3-0	2
		Total	**21**	**3-9-0**	**27**

III B.Tech – II Semester

Sl. No	Code	Subject	L	T-P-D	C
1	C322A	Power Semi Conductor Drives	4	1-0-0	4
2	C322B	Electrical Measurements	3	1-0-0	3
3	C322C	Computer Methods in Power Systems	4	1-0-0	4
4	C324G	Microprocessors and Microcontrollers	4	0-0-0	4
5	**ELECTIVE – I:**		3	0-0-0	3
	C322D	Utilization of Electrical Energy			
	C322E	Digital Control System			
	C322F	Energy Auditing, Conservation and Management			
6	C3204	Power Electronics & Simulation Lab	0	0-3-0	2
7	C3205	Microprocessors and Microcontrollers Lab	0	0-3-0	2
8	C3206	Computer Methods in Power Systems and simulation Lab	0	0-3-0	2
9	C3207	Industrial Internship	0	0-0-0	2
		Total	**18**	**3-9-0**	**26**

IV B.Tech – I Semester

Sl. No	Code	Subject	L	T-P-D	C
1	C412A	Instrumentation	4	1-0-0	4
2	C412B	Power System Operation and Control	4	1-0-0	4
3	C412C	High Voltage Engineering	4	0-0-0	4
4	C412D	Switch Gear and Protection	3	1-0-0	3
5	**ELECTIVE – II**		3	0-0-0	3
	C412E	Flexible AC Transmission systems			
	C412F	Modern Power Electronics			
	C412G	Electrical Machine Design			
	C412H	Advanced Control Systems			
6	**ELECTIVE – III:**		3	0-0-0	3
	C412I	Electrical Distribution systems			
	C412J	Analysis and design of Switched mode converters			
	C412K	Special Machines and Control			
	C410B	Optimization Techniques			
7	C4104	Electrical Measurements Lab	0	0-3-0	2
8	C4105	Power Systems & Simulation Lab	0	0-3-0	2
9	C4106	Soft Skills Lab - I	0	0-3-0	2
		Total	**21**	**3-9-0**	**27**

IV B.Tech – II Semester

Sl. No	Code	Subject	L	T-P-D	C
1	C420A	Management Science for Engineers	4	0-0-0	4
2	**ELECTIVE – IV:**		3	1-0-0	3
	C422A	Power Quality			
	C422B	H V D C Transmission			
	C425E	Artificial Neural Networks and Fuzzy Logic			
3	**ELECTIVE – V:**		3	1-0-0	3
	C422C	Power System Dynamics			
	C422D	EHV AC Transmission			
	C422E	Reliability Engineering & Application to Power Systems			
4	C4206	Soft Skills Lab - II	0	0-3-0	2
5	C4207	Industry Oriented Mini Project	0	0-0-0	2
6	C4208	Seminar	0	0-6-0	2
7	C4209	Project Work	0	0-15-0	10
8	C4210	Comprehensive Viva	0	0-0-0	2
		Total	**10**	**2-24-0**	**28**

Note: All end Examinations (Theory and Practical) are of three hours duration.
T-Tutorial L—Theory P—Practical D-Drawing C -Credits

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**0-0-0**	**3**

English
(Common to all branches)

UNIT - I:

-Word Formation-Word Disintegration
-Root/Base Word- Word Origin
-Affixation-Prefix & Suffix
-Synonym/Antonym-Homophone/Homonym/Homograph
-Use of Dictionary &Thesaurus
-Phrasal Verbs, Idioms
-One Word Substitutes
-Collocations
-Technical Vocabulary

UNIT - II:

Grammar

-Parts of Speech- Introduction to English Grammar
-All about- Noun, Pronoun, Verb, Adverb
- Adjective, Preposition, Conjunction, Interjection
- Articles- Use of Articles A, An and The.
-Punctuations

Tenses

-Tenses in English
-Use of appropriate Tenses in different contexts
-Use of Tenses in Narration

UNIT - III:

Improving Reading Skills

-Reading for Specific Purposes
-Reading for General Information
-Reading for facts
-Reading between/beyond the lines
-Reading for Skimming & Scanning
-Dialogue Reading
-Comprehension

UNIT - IV:

Basics of Writing

-Syntax & Sentence Structure
-Construction of Proper Sentences in English
-Sentences Types- Purposes
-Email Etiquette
-Note Making and Note Taking.

UNIT - V:

Common Errors in English

-Subject-Verb Agreement

Text Books:

1. **Language In Use - Intermediate: Self-Study Workbook with Answer Key/2008** Adrian Doff , PB Cambridge University Press.
2. **English Vocabulary in Use: Pre-Intermediate & Intermediate**(PB +CD ROM)/3rd Edition Stuart Redman Cambridge University Press.

Reference Books:

1. **Technical Communication: Principles And Practice** (With Dvd) 2nd Edition (English) 2nd Edition Sangeeta Sharma, Meenakshi Raman, Oxford Univesity Press
2. **The Fundamental Aspects of Communication Skills**/2009,Dr.P. Prasad, S.K Kataria & Sons **Active Grammar with Answer Level 1,2 &3** Davis Cambridge University Press

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - I Semester	**4**	**1-0-0**	**4**

Mathematics – I

(Common to all branches)

UNIT - I:

Sequences – Series

Basic definitions of Sequences and Series – Convergence and divergence – Ratio test – Comparison test – Integral test – Cauchy's root test – Raabe's test – Absolute and conditional convergence.

Function of Single Variable

Rolle's Theorem – Lagrange's Mean Value Theorem – Cauchy's mean value Theorem – Generalized mean value theorem (all theorems without proof).

UNIT - II:

Function of Several Variables

Functional dependence – Jacobian – Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT - III:

Curve Tracing : Cartesian, polar and parametric curves.

Geometrical applications of Differential Calculus: Radius of Curvature, Centre and Circle of Curvature-Evolutes and Envelopes

UNIT - IV:

Multiple Integrals: Double and triple integrals – change of order of integration – change of variable.

UNIT - V:

Vector Calculus: Gradient-Divergence-Curl and their related properties, Potential function – Laplacian and second order operators. Line integral – work done – surface integrals-Flux of a vector valued functions.

Vector integrals theorem: Green's –Stoke's and Gauss's Divergence Theorems (Statement & their verification).

Text Books:

1. **Grewal B.S, "Higher Engineering Mathematics"**, Khanna publications, 42nd edition 2012
2. **Advanced Engineering Mathematics** by Jain and S.R.K. Iyangar, Narosa Publications.

Reference Books:

1. **Engineering Mathematics** by B.V.Ramana, Tata McGrawhill Publishing company Ltd New Delhi, 5th edition, 2011
2. **Engineering Mathematics-I** by T.K.V. Iyengar & B.Krishna Gandhi & Others, S.Chand
3. **Engineering Mathematics-I** by G.Shankar Rao, I.K.International Publications.

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**3**

Engineering Physics
(Common to all branches)

UNIT - I

Crystallography

Space Lattice**,** Unit Cell, Lattice Parameters, Crystal Systems, Bravais Lattices, Packing Factor of SC, BCC, FCC, Diamond Structures, Miller Indices, Crystal Planes and Directions, Inter Planar Spacing of Orthogonal Crystal Systems

XRD &its applications: Basic Principles of XRD, Bragg's Law, X-Ray diffraction Methods: Laue Method, Powder Method, XRD its Applications.

UNIT - II

Defects in solids:

Vacancies, Substitution, Interstitial, Concentration of Frenkel and Schottky Defects, line defects (Qualitative) & Burger's Vector

Principles of Quantum Mechanics:

Waves and Particles, de Broglie Hypothesis , Matter Waves, G.P.Thomson , Davisson and Germer's Experiment, Heisenberg uncertainty principle, Schrödinger's Time Independent Wave Equation – Physical Significance of the Wave Function – Particle in a One-Dimensional potential well(Zero point energy).

UNIT - III

Dielectric Properties:

Electric Dipole, Dipole Moment, Dielectric Constant, Polarizability, Electric Susceptibility, Displacement Vector, Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities(Electronic and Ionic): Internal Fields in Solids, Clausius -Mossotti Equation, Ferro- electricity,piezo and Pyro Electricity, Its applications.

Magnetic Properties:

Permeability, Field Intensity, Magnetic Field Induction, Magnetization, Magnetic Susceptibility, Origin of Magnetic Moment, Bohr Magnetron, Classification of magnetic materials, Properties of Anti-Ferro and Ferri Magnetic Materials and their Applications ,Explanation of Hysteresis curve on the basis of Domain Theory of Ferro magnetism, soft and Hard Magnetic Materials.

UNIT - IV

Superconductivity:

Concept of superconductivity, Properties of Superconductors, Type-I and Type-II superconductor, BCS Theory, Applications of Superconductors.

Semiconductor Physics:

Fermi Level in Intrinsic and Extrinsic Semiconductors, Calculation of carrier concentration in Intrinsic &, Extrinsic Semiconductors, Hall Effect and its Applications.

UNIT - V

Lasers:

Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Einstein's Coefficients and Relation between them, Population Inversion, Lasing Action, Ruby Laser, Helium-Neon Laser, Semiconductor laser, Applications of Lasers

Optical fiber:

Principle of Optical Fiber, Construction of optical fiber, Acceptance Angle and Acceptance Cone, Numerical Aperture, Types of Optical Fibers: Step Index and Graded Index Fibers, Attenuation in Optical Fibers, Application of Optical Fiber in communication systems.

Text Books:

1. **Applied Physics – P.K.Mittal** (I.K.Internationalhosesepvt Ltd) (New Edition)
2. **Enginnering Physics** - P.K Palaniswamy (Scitech Publications India) Pvt Ltd, Fifth Print 2010).

Reference Books:

1. **Engineering Physics** – Senthi kumar ((Vrb Publishers Limited).
2. **Applied Physics for Engineers** – A.J. Dekker (Macmillan).
3. **Introduction to Solid State Physics** – C. Kittel (Wiley Eastern).

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**3**

Computer Programming
(Common to all branches)

UNIT - I:
Computer fundamentals-Hardware, software, computer language, translators, Compiler, Interpreter, Loader, and linker, Program Development steps-Algorithms, Pseudo code, flow charts, Specification for Converting Algorithms into Programs basic,

Introduction to C Language – History, Simple C Program, Structure of a C Program, Identifiers, Basic data types, user defined data types, Variables, Constants, type qualifiers, Managing Input / Output, Operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Simple C Programming examples.

UNIT - II:
Selection Statements – if and switch statements, Repetitive statements – while, for, do-while statements, C Programming examples, other statements related to looping – break, continue, go to, C Programming examples. Arrays– Basic concepts, one-dimensional arrays, two – dimensional arrays, multidimensional arrays, C programming examples.

UNIT - III:
Introduction to Structured Programming, Functions- basics, user defined functions, inter function communication, Standard functions, Storage classes-auto, register, static, extern, scope rules, arrays to functions, recursive functions, example C programs. Command line arguments in C.
Strings – Basic concepts, String Input / Output functions, arrays of strings, string handling functions, strings to functions, C programming examples.

UNIT - IV:
Derived types – Structures – Basic concepts, nested structures, arrays of structures, structures and functions, unions, bit fields, C programming examples.
Pointers – Basic concepts, pointers and functions, pointers and strings, pointers and arrays, pointers and structures, self-referential structures, example C programs.

UNIT - V:
Introduction Using Files in C, Declaration of File Pointer, Opening a File, Closing and Flushing Files, Working with Text Files, Character Input and Output, End of File (EOF). Creating header file and using in the C Program. Working with Binary Files, Direct File Input and Output, Sequential Versus Random File Access, Files of Records, working with Files of Records, Random Access to Files of Records, Other File Management Functions, Deleting a File Renaming a File. Low-Level I/O. Working with C graphics functions.

Text Books:
1. **Programming in C.** P. Dey and M Ghosh, Oxford University Press.
2. **The C Programming Language**, by Brian W. Kernighan , Dennis M. Ritchie

Reference Books:
1. **C programming** A Problem-Solving Approach by Behrouz A.Forouzan
2. **Programming with C**, B.Gottfried, 3rd edition, Schaum's outlines, TMH.
3. **Graphics Under C** by Yashavant Kanetkar, BPB Publications, 2003

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - I Semester	**1**	**0-0-3**	**3**

Engineering Drawing - I
(Common to all branches)

UNIT - I
Introduction To Engineering Drawing:
Principles of Engineering Drawing and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions.
Scales:
Different types of Scales, Plain scales, Vernier Scale, Digonal Scale, Scales of chords.

UNIT - II
Construction Of Curves Used In Engineering Practice:
a) Conic Sections Ellipse- General, Concxentric Circle, Arcs of circle and Oblong Method
Parabola- General, Tangent and Rectangle Methods
Hyperabola-General, Point/Rectangle Method
b) Cycloid, Epicycloid and Hypocycloid
c) Involute for Circle, Rectangle and Triangle

UNIT - III
Projections Of Points And Lines:
Principles of Orthographic Projections – Conventions – First and Third Angle, Projections of Points and Lines inclined to planes, True lengths, traces.

UNIT - IV
Projections Of Planes:
Projections of regular Planes, auxiliary planes and Auxiliary projection inclined to both planes.

UNIT - V
Projections Of Solids:
Projections of Regular Solids inclined to both planes – Auxiliary Views.

Text Books:
1. **Engineering Drawing,** N.D. Bhat / Charotar
2. **Engineering Drawing and Graphics**, Venugopal / New age.

Reference Books:
1. **Engineering Drawing** – Basant Agrawal, TMH
2. **Engineering drawing** – P.J. Shah.S.Chand.
3. **Engineering Drawing**, Narayana and Kannaiah / Scitech publishers.

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**2**

Computer Programming Lab
(Common to all branches)

1:
Simple C programs -to implement basic arithmetic operations – sum, average, product, smallest, largest of the numbers, difference, quotient and remainder of given numbers etc.

2:
Programs on if, else-if, nested if, else if ladder - largest and smallest of given numbers, to find the grade of a student based on marks, roots of a quadratic equation etc.

3:
a. Programs on switch-case – to check the type of a given character, to find the grade of a student etc.
b. Programs on while and do-while- to find factorial, Fibonacci series, GCD, Sin(x), Cos(x) series, to check whether a given number is an Armstrong, Palindrome, Perfect, number conversion, and Prime number etc.

4:
Programs on "for loop" - sum of n natural numbers, factorial, sin(x), to generate Pascal's triangle etc.

5:
a. Programs on nested loops – check for Fibonacci prime, Pyramids of numbers, generation of prime numbers in the given range, multiplication table etc.
b. Programs using break, go to, continue.

6:
a. Programs on 1-D array-finding Minimum and maximum element,Sorting and Searching etc.
b. Programs on 2-D array – Sum, product and Multiplication of two Matrices etc.

7:
a. Programs on Functions-Implementation of user defined functions categories, passing of arrays to functions etc.
b. Programs on recursion - factorial of a given integer, GCD of two given integers etc.

8:
a. Programs on String handling functions-Copying, reverse, substring, concatenation.
b. Programs on structure and unions.

9:
Programs using pointers- pointer basic operations, pointers and functions etc.

10:
Programs on pointers and structures, Pointers and arrays, pointers and strings.

11:
Programs on files-Implementation of file handling functions. Programs on files error handling. Programs on Dynamic memory allocation.

12:
Programs on command line arguments. Programs on preprocessor directives.

13:
Program draws basic shapes such as circle, line, rectangle, ellipse and display text on screen using c graphics. Smiling face Animation using c graphics displaying face at random position on screen.

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**2**

Engineering Physics Lab
(Common to ECE, EEE, CSE, IT & ECM)

Minimum ten Experiments out of Twelve

List of Experiments:

1. Torsional pendulum.
2. Melde's experiment – Transverse and longitudinal modes.
3. Time constant of an R-C circuit.
4. L-C-R circuit.
5. Magnetic field along the axis of current carrying coil – Stewart and Gees method.
6. Study the characteristics of LASER sources.
7. Study the characteristics of light emitting diode.
8. Evaluation of numerical aperture of given fiber.
9. Bending losses in optical fiber.
10. Energy gap of a material of p-n junction.
11. Impedance Analysis/Dielectric constant of Measurements of materials.
12. Analysis of XRD spectra.

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**2**

Engineering Workshop
(Common to all branches)

TRADES FOR EXPERMENTS

Three experiments from each trade

- **(i)** Carpentry
- **(ii)** Fitting
- **(iii)** Black Smithy
- **(iv)**Welding

TRADES FOR DEMONSTRATION & EXPOSURE

- **(i)** Power Tools in Construction, Wood working, Electrical Engineering works and Mechanical Engineering
- **(ii)** Plumbing

TEXT BOOKS:

1. **Work shop manual**-P.Kannaiah, K.Narayana, Scitech Publishers
2. **Workshop Manual**-Venkat Reddy

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**2**

English Lab
(Common to all branches)

MULTI-MEDIA LANGUAGE LAB

Total Experiments :12

1. Introduction to Phonetics
2. Sounds of English- Vowels, Diphthongs
3. Consonants
4. Introduction to Stress, Rhythm and Intonation
5. Improving Listening Skills

ENGLISH COMMUNICATION SKILLS LAB

6. Self Introduction,
7. Introducing others
8. Agreeing/Disagreeing and Asking Questions
9. 'Just A Minute' Sessions (JAM) & Situational Dialogues
10. Describing Objects / Situations / People.
11. Oral Presentations- Prepared and Extempore.
12. Debate

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**0-0-0**	**3**

Technical English
(Common to all branches)

UNIT - I:

Formal & Informal Writing
-Formal & Informal Writing, Cover Letter

UNIT - II:

Writing Techniques
-Developing Paragraphs- Cohesion
-Developing passage by arranging paragraphs

UNIT - III:

Official Correspondence
- Types of Business Correspondence
-Technical Vocabulary, Report writing, Applications, Complaints & Requisitions

UNIT - IV:

- e-Writing
-e-Mail Etiquette

UNIT - V:

Presentation Skills
- Paper, Seminars, Conferences, Symposia, Workshop presentation
-Power Point Presentation(Microsoft Office Suit)
-Project Proposal Presentation

Text Books:

1. **Fundamentals of Tech comm.-Oxford-**meenaskhi raman,sangeeta Sharma
2. **Strengthen your writing** –V.R Narayana orient longman swami

Reference Books:

1. **A communicative grammar English Geoffrey leech** Jan svartuik person education
2. **Strengthen your steps –** Maruthi publication Hyderabad.

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - II Semester	**4**	**1-0-0**	**4**

Mathematics – II
(Common to all branches)

UNIT - I:
Differential equations of first order and their applications
Overview of differential equations – exact, linear and Bernoulli. Applications to Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories
Higher Order Linear differential equations and their applications
Linear differential equations of second and higher order with constant coefficients, RHS term of the $f(X)=e^{ax}$, Cosax, Sinax, x^n, e^{ax} V(x), x^n V(x) and method of variation of parameters. Applications on bending of beams, Electrical circuits, simple harmonic motion.

UNIT - II:
Laplace transform and its application to Ordinary differential equations
Laplace transform of standard functions – Inverse transform – first shifting theorem, Transforms of derivatives and integrals – Unit step function – second shifting theorem –Convolution theorem-Periodic function – differentiation and integration of transforms-Application of Laplace transforms to ordinary differential equations.

UNIT - III:
Fourier Series
Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval- even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

UNIT - IV:
Transforms
Fourier Transform: Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms, Parseval's formula.
Z-Transform : Z-Transform-Properties-Damping rule-shifting rule-Initial & Final value theorems-convolution theorem –solution of difference equations by Z-transform.

UNIT - IV:
Partial differential equations
Introduction and Formation of partial equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (Standard type) equations-Classification of PDE-Finite difference methods for: Elliptic, Hyperbolic & Parabolic equations-solution of Heat equation(one dimensional)

Text Books:

1. **Grewal B.S, "Higher Engineering Mathematics",** Khanna publications, 42nd edition 2012
2. **Advanced Engineering Mathematics** by Jain and S.R.K. Iyengar, Narosa Publications.

Reference Books:

1. **Engineering Mathematics-I, Mathematical Methods** by T.K.V. Iyengar & B.Krishna Gandhi & Others, S.Chand
2. **Engineering Mathematics-I, Mathematical methods'** by G.Shankar Rao, I.K.International Publications.
3. **KREYSZIG. E, "Advanced Engineering Mathematics"** JohnWiley & Sons Singapore, 10th edition, 2012.

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - II Semester	**4**	**1-0-0**	**4**

Mathematical Methods
(Common to EEE, ECE, CSE, IT& ECM)

UNIT - I:
Solution of Algebraic and Transcendental Equations
Solution of Algebraic and Transcendental Equations: Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton Raphson Method.
Interpolation:
Introduction – Errors in Polynomial Interpolation – Finite differences – Forward Difference – Backward difference – Central difference – Symbolic relations and separation of symbols – Difference Equations – Differences of polynomial – Newton's formulae for interpolation – Central difference interpolation Formulae – Gauss Central Difference Formulae – Interpolation with unevenly spaced points.

UNIT - II:
Solution for linear systems
Matrices and Linear systems of equations: Elementary row transformations- Rank-Echelon form, Normal forms–Existence of solution-Gauss elimination with pivoting-Gauss Jordan Method-Ill conditioned systems-Jacobi iterative method-Gauss seidal method-convergence of iterative methods.

UNIT - III:
Vector Spaces & Linear Transformatins
Vector Spaces: Vector Spaces- Linear independence- Basis & Dimensions- Linear transformation-Matrix linear transformation- permutations-inner product- orthogonal and – Orthonormal sets – Gram-Schmidt process.
Linear Transformations: Properties of Real & Complex Matrices, orthogonal matrices, Linear Transformation – Orthogonal Transformation. Eigen values and Eigen vectors of Real & complex matrices and their properties.

UNIT - IV:
Eigen Values & Eigen Vectors
Quadratic forms- Reduction of quadratic form to canonical form – Rank – Positive, Negative definite – semi definite – index – signature- Sylvester law, Singular value decomposition.
Eigen values, Eigen vectors – properties, Cayley-Hamilton – Theorem (with Proof) – Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonization of matrix. Calculation of powers of matrix – Model and spectral matrices.

UNIT - V:
Numerical Differentiation & Numerical solution of IVP's in ODE
Numerical Differentiation:
Derivatives using Forward, Backward & central difference formulae.
Numerical solution of IVP's in ODE:
Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations – Euler's Method- Runge-Kutta Methods –Predictor-Corrector Methods.

Text Books:

1. **Grewal B.S, "Higher Engineering Mathematics**", Khanna publications, 42nd edition 2012
2. **Advanced Engineering Mathematics** by Jain and S.R.K. Iyangar, Narosa Publications.

Reference Books:

1. **Engineering Mathematics** by B.V.Ramana, Tata McGrawhill Publishing company Ltd. New Delhi, 5th edition, 2011.
2. **Engineering Mathematics-I** by T.K.V. Iyengar & B.Krishna Gandhi & Others, S.Chand and G.Shankar Rao, I.K.International Publications.
3. **KREYSZIG. E, "Advanced Engineering Mathematics**" JohnWiley & Sons Singapore, 10th edition, 2012

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**0-0-0**	**3**

Engineering Chemistry

(Common EEE, ECE, CSE, IT, ECM branches)

UNIT - I:

Electrochemistry and Batteries:

Concept of Electrochemistry, Conductance-Electrolyte in solution, Conductance-Specific, Equivalent and molar conductance, Kolrausch's Law, application of conductance. EMF: Galvanic Cells, Reference Electrode, Nernst equation, galvanic series, Application of EMF measurements.

Batteries: Primary and secondary cells, (lead-Acid cell, Ni-Cd cell, Lithium cells). Application's of batteries. Fuel cells – Hydrogen – Oxygen fuel cells, advantages of fuel cells.

UNIT - II:

Polymers:

Introduction-classification-natural and synthetic polymers; Types of Polymerization (Chain growth & Step growth).Plastics: Thermoplastic & Thermoset resins. Engineering applications of: Teflon, Bakelite, Nylon. Conducting polymers- Poly acetylene, polyaniline- conduction, doping, and its application. Fibers – polyester, fiber reinforced plastics (FRP), applications.

UNIT - III:

Energy sources:

Introduction- fuels, classification – conventional fuels (solid, liquid, gaseous). Calorific value-HCV and LCV. Solid fuels – coal –processing of coal. Liquid fuels – primary – petroleum – refining of petroleum-cracking knocking synthetic petrol – Bergius and Fischer-tropsech's process.

UNIT - IV:

Water Technology:

Introduction, Hardness: Causes, expression of hardness – units – types of hardness, estimation of temporary & permanent hardness of water. Boiler troubles – Scale & sludge formation, caustic embrittlement, corrosion, priming & foaming Softening of water (Internal & external treatment-Lime soda, Zeolites, Ion exchange process) Reverse osmosis, electro dialysis.

UNIT - V:

Photochemistry:

Laws of photochemistry - Grotthuss–Draper law, Stark–Einstein law and Lambert- Beer Law. Photo processes - Internal Conversion, Inter-system crossing, Fluorescence, Phosphorescence. **Spectroscopy:** Electromagnetic spectrum - Absorption of radiation – Electronic, Vibrational and rotational transitions. UV-visible and IR spectroscopy – principles, instrumentation (Block diagram only).

Nanochemistry:

Introduction. Synthesis: Top down and bottom up processes, Properties and Applications and future prospects.

Text Books:

1. **Text Book of Engineering Chemistry** – Shasi Chawla, Dhantpat Rai publishing Company, New Delhi (2008).
2. **Engineering Chemistry** by P.C Jain & Monica Jain, Dhanpatrai Publishing Company (2008).

Reference Books:

1. **Text of Engineering Chemistry** by S.S. Dara & Mukkati S. Chand & Co,New Delhi(2006)
2. **Engineering Chemistry** by B. Siva Shankar Mc.Graw Hill Publishing Company Limited , New Delhi(2006)
3. **2Engineering Chemistry** J.C. Kuriacase & J. Rajaram, Tata McGraw Hills co., New Delhi (2004).

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B.Tech. EEE	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**1-0-0**	**3**

Data Structures
(Common to all branches)

UNIT - I:

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation, Doubly linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

UNIT - II:

Stacks-Operations, array and linked representations of stacks, stack applications-infix to postfix conversion, postfix expression evaluation, recursion implementation. Queues-operations, array and linked representations. Circular Queue operations, Dequeue, applications of queue

UNIT - III:

Trees – Definitions, Binary tree representation, Binary search tree, binary tree traversals, AVL tree – operations, B-tree – operations, B+ trees, Red Black tree.

UNIT - IV:

Graphs: Terminology, sequential and linked representation, graph traversals : Depth First Search & Breadth First Search implementation. Spanning trees, Prims and Kruskals method.

UNIT - V:

Searching and Sorting – Big O Notation, Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort, Searching-linear and binary search methods.

Text Books:

1. **Data Structures Using C** Reema Thareja, Oxford University Press, 2011 Learning.
2. **Data Structures Using C** (Paperback) by Aaron M. Tenenbaum

Reference Books:

1. **C Programming & Data Structures**, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage
2. **C& Data structures** – P. Padmanabham, Third Edition, B.S. Publications.
3. **Data Structures using C** – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education

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Professional Ethics
(Common to all branches)

UNIT - I :
Basic Concepts
Introduction, terminology, stake holders, governing edicts, contextual aspects, ethical dilemmas, life skills, emotional, intelligence, Indian and western thoughts on ethics, value education, dimensions of ethics, setting goals in life, importance of morality and ethics, basic ethical principles, moral developments theories, classification of ethical theories, some basic theories, moral issues, moral dilemmas autonomy.

UNIT - II :
Professional and professionalism
Introduction, meaning of profession, professionals, professionalism, professional association, professional's roles and professional risks, professional accountability, successful professional, ethics and profession, engineering profession, engineering as social experimentation, engineering professionals, engineering ethics, roles of engineers, balanced out look on law, rights and responsibilities as citizens, professional responsibilities, professional rights.

UNIT - III :
Global issues and safety
Introduction, current scenario, business ethics, environmental ethics, computer ethics, media ethics, war ethics, bio-ethics, research ethics, intellectual property right, safety and risk, assessment of risk, risk and cost, engineers responsibility for safety, risk benefit, analysis, risk cause and management, case studies, providing for safe exit, ethical issues of safety.

UNIT - IV:
Ethical codes and audits
Introduction, need for ethical codes, sample codes, corporate codes, limitations of the codes, need for ethical audit, ethical profile of organizations, ethical standards and bench marketing, audit brief, ethical auditors, procedure for ethical audit, ethical audit report, examples.

UNIT - V:
Human values and ethical living
Introduction, terminology, domains of learning, human values, attitudes, values, attitudes and professionals, needs of life, harmony in life, what is ethical living, case studies.

Text Books:

1. **Professional ethics** by R. Subramanian, Oxford press.
2. **Text book on Professional ethics** and human values by R.S.Nagarajan, New age international.

Reference Books:

1. **Professional ethics** and human value by D.R.Kiran, Tata McGraw Hills education.
2. **Ethics in engineering** by Mike W. Martin and Roland Schinzinger, Tata McGraw Hills education.
3. **Fundamental of Ethics** by Edmund G Seebauer and Robert L.Barry, Oxford university press.

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Data Structures Lab
(Common to all branches)

1:

Write a C program that uses functions to perform the following operations on singly linked list:

I) Creation II) Insertion III) Deletion IV) Traversal V) merge two single linked lists

2:

Write a C program that uses functions to perform the following operations on doubly linked list.

I) Creation II) Insertion III) Deletion IV) Traversal

3:

Write a C program that uses functions to perform the following operations on circular linked list:

II) Creation II) Insertion III) Deletion IV) Traversal

4:

Write a C program that implement stack operations using

I) Arrays II) Linked Lists

5:

I) Write a C program to convert infix expression to postfix expression using stack

II) Write a C program to evaluate postfix expression

6:

I) Programs using recursion

II) Write a C program to convert infix expression to prefix expression using stack

7:

Write a C program to implement Linear queue using

I) Arrays II) Linked Lists

8:

Write a C program to perform following operations on a circular Queue

I) insertion II) deletion III) search and count

9:

Write a C program to perform following operations on a circular DeQueue

I) insertion II) deletion III) search and count

10:

I) Write a C program to implement Linear search

II) Write a C program to implement Binary Search

11:

Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:

I) Bubble sort II) Selection sort III) Insertion Sort

12:

Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:

I) Merge sort II) Quick sort

13:

I) Write a C Program to implement binary tree traversals

II) Write a C Program to implement AVL tree operations

14:

1. Implementation of a Graph representation using Adjacency Matrix
2. Write a C program to implement graph traversals.

Text Books:

1. **C Programming & Data Structures**, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. **Data Structures Using C** (Paperback) by Aaron M. Tenenbaum

Reference Books:

1. **C& Data structures** – P. Padmanabham, Third Edition, B.S. Publications.
2. **Data Structures using C** – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI
3. **C Programming & Data Structures**, E. Balagurusamy, TMH.

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Engineering Chemistry Lab
(Common to EEE, ECE, CSE, IT & ECM)

List of Experiments: (Total 12 experiments)
Introduction:

- Laboratory safety and precautions.
- Preparation of solution.
- Determination of unknown concentration of given solutions and calculations.

Titrimetry:

1. Estimation of hardness of water by EDTA method.

Mineral Analysis:

2. Determination of percentage purity of pyrolusite.

Instrumental Methods:

1. Conductometric titration of a)strong acid Vs strong base
b) Weak acid vs strong base
c) Mixture of acids vs strong base

3. Effect of dilution on conductance for i) Strong acids, ii) weak acids and iii) Ionic salts.
4. Determination of ferrous iron in cement by colorimetric method
5. Estimation of Copper by Colorimetric method.

Physical Properties:

6. Determination of viscosity of sample oil by Oswald's viscometer
7. Determination Surface Tension of given unknown liquid using stalganometer.

Preparations:

8. Preparation of organic compound Asprin.

Demonstration Experiments:

10. Preparation of Thiokol rubber.

Text Books:

1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. Text Book of engineering chemistry by R. N. Goyal and Harrmendra Goel.

Reference Books:

1. Inorganic quantitative analysis, Vogel.
2. A text book on experiments and calculation Engg. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

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IT Workshop

(Common to EEE, ECE, CSE, IT & ECM)

EXPERIMENT 1. Familiarizing with Computer Hardware

Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

EXPERIMENT 2. PC Assembly

Every student should disassemble and assemble the PC back to working condition. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

EXPERIMENT 3. Installation of Windows

Every student should individually install MS windows on the personal computer.

EXPERIMENT 4. Installation of Linux

Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux.

EXPERIMENT 5. Hardware Troubleshooting:

Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

EXPERIMENT 6. Software Troubleshooting:

Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

EXPERIMENT 7. Networking Concepts

Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured

EXPERIMENT 8. Internet and Search Engines

Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google / yahoo / Bing. Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and / or worms.

EXPERIMENT 9. Word Processor

The mentor needs to give an overview of Microsoft (MS) office / Libre Office tool - Overview of toolbars, saving files, Using help and resources, rulers, format painter. Overview of formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option, Inserting Table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes. Overview of Creating a Table of Content, Newspaper columns, Images from files and clipart. Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXPERIMENT 10. Spread Sheet

The mentor needs to tell the importance of MS Excel / Libre office Calc tool - teach toolbars, saving excel files, Using help and resources. Create employee payroll using functions. Other features to be covered are Cell Referencing, Charts, Renaming and Inserting worksheets, Hyper linking, LOOKUP/VLOOKUP, Sorting, Conditional formatting.

EXPERIMENT 11. Presentation

The mentor needs to give overview of MS Power Point / Libre office Impress tool – to create basic power point presentation. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows. Students need to create a PPT and present it.

EXPERIMENT 12. Virtual Box Installation

Installing multiple operating systems on your PC using (virtual box) / hyper-v / VM Ware

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Complex Analysis
(Common to ECM, ECE & EEE)

UNIT-I:
Special Functions I
Gamma and Beta Functions– Their properties – evaluation of improper integrals. Bessel functions – properties – Recurrence relations – Orthogonality.
Special Functions II: Legendre polynomials – Properties – Rodrigue's formula – Recurrence relations – Orthogonality.

UNIT-II:
Functions Of A Complex Variable
Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann conditions, Maxima – Minima principle, Harmonic and conjugate harmonic functions – Milne – Thompson method.

UNIT - III:

Complex integration
Line integral – evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula. Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series.

UNIT – IV:
Complex power series
Singular point –Isolated singular point – pole of order m – essential singularity. (Distinction between the real analyticity and complex analyticity)
Contour Integration
Residue – Evaluation of residue by formula and by Laurent series - Residue theorem, Evaluation of integrals of the type
(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{c}^{c+2\pi} f(\cos\theta, \sin\theta)d\theta$

UNIT - V:
Conformal mapping
Transformation by e^z, Imz, z^2, z^n (n positive integer), Sin z, cos z, z + a/z. Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles and cross ratio – determination of bilinear transformation mapping 3 given points .

Text Books:

1. **Grewal B.S, "Higher Engineering Mathematics**", Khanna publications, 42nd edition 2012
2. **Advanced Engineering Mathematics** by Jain and S.R.K. Iyangar, Narosa Publications.

Reference Books:

1. **Engineering Mathematics-III** by T.K.V. Iyengar & B.Krishna Gandhi & Others, S.Chand
2. **Engineering Mathematics-III** by G.Shankar Rao, I.K.International Publications.
3. **KREYSZIG. E, "Advanced Engineering Mathematics"** JohnWiley & Sons Singapore, 10th edition, 2012.

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Network Theory-I

UNIT-I

Introduction to Electrical Circuits:

Circuit concept –R-L-C parameters-Voltage and Current sources- Independent and dependent sources-source transformation-Voltage - Current relationship for passive elements (for different input signals-square, ramp, saw tooth, triangular)Kirchhoff's laws – network reduction techniques-series, parallel, series parallel, star-to-delta or delta-to-star transformation, Nodal analysis, mesh analysis, super node and super mesh for D.C excitations.

UNIT-II

Single Phase A.C Circuits:

R.M.S and Average values and form factor for different periodic wave forms, Steady state analysis of R,L and C (in series, parallel and series parallel combinations) with sinusoidal excitation-Concept of Reactance, Impedance, Susceptance and Admittance- Phase and Phase difference – concept of power factor, Real and Reactive powers – J-notation, Complex and Polar forms of representation, Complex power

Locus diagrams & Resonance:

Locus diagrams - series R-L, R-C, R-L-C and parallel combination with variation of various parameters - Resonance-series, parallel circuits, concept of band width and Q factor.

UNIT-III

Network topology:

Definitions – Graph – Tree, Basic cutest and Basic Tieset matrices for planar networks – Loop and Nodal methods of analysis of Networks with dependent & independent voltage and current sources – Duality & Dual networks.

UNIT-IV

Network theorems (with D.C & A.C):

Superposition, Thevenin's, Norton's, Maximum Power Transfer, Reciprocity, Millman's Tellegen's, and Compensation theorems for D.C& A.C excitations.

UNIT-V

Magnetic Circuits:

Magnetic circuits-Faraday's laws of electromagnetic induction-concept of self and mutual inductance-dot convention-coefficient of coupling-composite magnetic circuit-analysis of series and parallel magnetic circuits

Electrical safety, wiring &introduction to power system:

Safety measures in electrical system-types of wiring-wiring accessories-staircase, fluorescent lamps & corridor wiring-Basic principles of earthing-Types of earthing, simple layout of generation, transmission & distribution of power.

TEXT BOOKS:

1. **Engineering circuit analysis** by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition 2014.
2. **Circuits & Networks** by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill 2013.

REFERENCE BOOKS:

1. **Electric Circuits** by 2014 A. Chakrabarthy, Dhanipat Rai & Sons
2. **A Course in Electrical Installation Estimating and Costing Paperback** – 2013 by J.B. Gupta
3. **Network Analysis** by 2012 M.E Van Valkenberg.

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Environmental Studies
(Common to all branches)

UNIT - I:
Ecosystems & Natural Resources, **Biodiversity:**
Classification of Resources: Living and Non-Living resources, Renewable and Non-Renewable resources. Water resources: use and over utilization, Land resources, land degradation, Forest resources, Mineral resources uses & Exploitation Energy resources: growing energy needs, use of alternate energy sources. Concept of ecosystem, Classification of ecosystem, Functions of ecosystem, Food chains, Food webs and ecological pyramids, Flow of energy, Biogeochemical cycles, Biomagnifications, carrying capacity. Species, Ecosystem Diversity, Hotspots, Value of Biodiversity, Threats to Biodiversity, and Conservation of Biodiversity: In – Situ and Ex-Situ Conservation.

UNIT - II:
Environmental Pollution And Control:
Classification of pollutions and pollutants, causes, effects of water, air, noise pollution, Introduction to control technologies: Water (primary, secondary, tertiary), Air(particulate and gaseous emissions), Soil(conservation and remediation), Noise(controlling devices) Solid waste, (Municipal) types, collection and disposal methods, characteristics of e-waste & hazardous waste, biomedical waste management. Biological disasters, pandemic and epidemics, Biological warfare.

UNIT - III:
Global Environmental Problems And Global Efforts:
Green house effect, Green House Gases (GHG), Global Warming, Sea level rise, climate change and their impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification, International conventions/protocols: Earth Summit, Kyoto Protocol and Montreal Protocol, green-belt-development, Concept of Green Building, Clean Development Mechanism (CDM).

UNIT - IV:
Environmental Impact Assessment (Eia) And Environmental Management Plan:
Definition of Impact, classification of impacts, methods of baseline data acquisition. Impacts on different components: such as human health resources, air, water, flora, fauna and society, EIA guide lines as per ministry of environment & forest, impact assessment methodologies. Environmental Impact Statement (EIS). Environmental management plan (EMP).

UNIT - V:
Environmental Policy, Legislation, Rules And Regulations & Towards Sustainable Future:
Concept of Sustainable Development, Threats to Sustainability, Strategies for achieving Sustainable development, Environmental Ethics, Environmental Economics, Concept of Green Computing, Green chemistry and low Carbon life styles.**:** National Environmental Policy, Environmental Protection Act: Air (Prevention and control of pollution) Act-1981, Water (Prevention and control of pollution) Act-1974, Water pollution Cess Act-1977, Forest Conservation Act, solid waste (biomedical waste and hazardous waste)management and handling rules.

Text Books:

1. **Environmental Science And Technology** by M.Anji Reddy 2007
2. **Principles Of Environmental Science And Engineering** by P.Venugopal Rao

Reference Books:

1. **Tata McgrawHill :** Introduction to Environmental Studies by Benny Joseph
2. **Environmental Studies** by Erach Bharucha 2005, University Grants Commission, University Press.

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Electronic Devices and Circuits
(Common to EEE, ECE, CSE, IT & ECM)

Unit- I:

P-N Junction Diode

Qualitative Theory of p-n Junction, p-n Junction as a Diode, Diode Equation, Volt-Ampere Characteristics, Temperature dependence of VI characteristic, Ideal versus Practical – Resistance levels (Static and Dynamic), Transition and Diffusion Capacitances, Diode Equivalent Circuits, Load Line Analysis, Breakdown Mechanisms in Semi Conductor Diodes, Zener Diode Characteristics.

Rectifiers and Filters: The p-n junction as a Rectifier, Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Harmonic components in a Rectifier Circuit, Inductor Filters, Capacitor Filters, L- Section Filters, π- Section Filters, Comparison of Filters, Voltage Regulation using Zener Diode.

Unit- II:

Bipolar Junction Transistor

The Junction Transistor, Transistor Current Components, Transistor as an Amplifier, Transistor Construction, BJT Operation, BJT Symbol, Common Base, Common Emitter and Common Collector Configurations, Limits of Operation , BJT Specifications.

Transistor Biasing and Stabilization: Operating Point, The DC and AC Load lines, Need for Biasing, Fixed Bias, Collector Feedback Bias, Emitter Feedback Bias, Collector - Emitter Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization against variations in V_{BE} and β, Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability.

Unit-III:

Small Signal Low Frequency BJT Models

BJT Hybrid Model For CE,CB and CC Configuration, simplified H- parameter model Determination of h-parameters from Transistor Characteristics, Comparison of CB, CE, and CC Amplifier Configurations, Conversion of h-parameters CE to CB, CE to CC, vice versa

Unit-IV:

Field Effect Transistor

The Junction Field Effect Transistor (Construction, principle of operation, symbol) – Pinch-off Voltage - Volt-Ampere characteristics, The JFET Small Signal Model, MOSFET (Construction, principle of operation, symbol), MOSFET Characteristics in Enhancement and Depletion modes.

FET Amplifiers: Biasing of FET, FET as Voltage Variable Resistor, Comparison of BJT and FET, Introduction to UJT.

Unit V:

Special Purpose Electronic Devices

Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram) and Varactor Diode. Principle of Operation of Schottky Barrier Diode, SCR, and Semiconductor Photo Diode.

Text Books:

1. **Electronics Devices and circuits** by David Bell Oxford press.
2. **Millman's Electronic Devices and Circuits** – J. Millman, C.C.Halkias, and Satyabrata Jit, 2ed., 1998, TMH.

References Books:

1. **Electronic Devices and Circuits** – R.L. Boylestad and Louis Nashelsky, 9 ed., 2006, PEI/PHI.
2. **Integrated Electronics** – J. Millman and Christos C. Halkias, 1991 ed., 2008, TMH.
3. **Electronic Devices and Circuits** - K. Lal Kishore, 2 ed., 2005, BSP.

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Electro Magnetic Fields Theory

Unit-I

Static Eletric Field:

Electrostatic Fields – Coulomb's Law and filed intensity Electric filed due to continuous charge distributions –Eletric flux density –Gauss"s law –application of Gauss"s law –Maxwell"s first law-Eletric potential –relation between E&V –An Electric Dipole- Dipole moment-Potential and electric field due to an Electric Dipole –torque on an Electric Dipole in an Electric field – Energy density in Electrostatic fields applications.

Unit-II

Static Eletric Fields In Material Space:

Electrostatic material –Properties of materials-Convection and conduction Currents – Conductors –Polarization in dielectrics dielectric constant and strength –Continuity equation and relaxation time –Dieletric boundary conditions- Capacitance – Capacitance of parallel plate and spherical and Co-axial capacitors with composite Dielectrics – Energy stored and energy density in a static electric field- Laplace's and Poison's equations – Solution of Laplace's equation in one variable.

Unit-III

Static Magnetic Field:

Static magnetic fields – Biot-Savart's law - Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0. - Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Curl (H)=Jc, Field due to a circular loop, rectangular and square loops.- Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations

Unit -IV

Magnetic Force ,Materials And Devices:

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.

Self and Mutual inductance – Neumans's formulae – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field. Introduction to permanent magnets, their characteristics and applications

Unit-V

Maxwell's Equation:

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth –Time varying potentials –Time varying harmonic field equation, Curl (E)=-∂B/∂t – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector

Text Books

1. **Engineering Electromagnetics** by William H. Hayt & John. A. Buck Mc. GrawHill Companies, 7th editon.2006.
2. **Electromagnetic Fields"** by Sadiku, Oxford Publications

References Books

1. **Introduction to Electro Dynamics** by D J Griffiths, Prentice-Hall of India Pvt.Ltd, 2nd editon
2. **Electromagnetics** by J. D Kraus Mc Graw-Hill Inc. 4th edition 1992. 3. Electromagnetic fields, by S. Kamakshaiah, Right Publishers, 2007.

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Electrical Machines I

UNIT – I
Electromechanical Energy Conversion:
Electromechanical Energy conversion – forces and torque in magnetic field systems – energy balance – energy and force in a singly excited magnetic field system, determination of magnetic force - co-energy – multi excited magnetic field systems. Torque Expression

UNIT – II
D.C. Generators:
Construction & Operation D.C. Generators – Principle of operation – Action of commutator – constructional features – DC Armature Windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation. Classification Of Dc Generators- Self Excited , Separately Excited .Open Circuit Characteristics ,Critical Resistance & Speed .Causes Of Failure Of Self Excitation & Their Remedies – Problems

UNIT – III
Armature Reaction In D.C. Generator:
Armature reaction –Effects –Distribution Of Field Mmf & Armature Mmf – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation. Generator Characteristics-Power Stages-Losses-Efficiency-Parallel Operation-Problem

UNIT – IV
D.C. Motors:
D.C Motors – Principle of operation – Back E.M.F. - VOLTAGE &Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation. Condition For Maximum Mechanical Power Developed. Power Stages. Efficiency –Condition For Maximum Efficiency-Problems

UNIT – V
Speed Control Of D.C. Motors:
Speed control of D.C. Motors: Armature voltage and field flux control methods. Ward-Leonard system. Principle of 3 point and 4 point starters – protective devices. Testing of d.c. machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency Methods of Testing – direct, indirect and regenerative testing – brake test – Swinburne‘s test – Hopkinson‘s test – Field‘s test – Retardation test – separation of stray losses in a d.c. motor test.

Text Books:
1. **Electric Machinery** – A. E. Fritzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th edition
2. **Electrical Machines** – P.S. Bimbra., Khanna Publishers

Reference Books:
1. **Performance and Design of D.C Machines** – by Clayton & Hancock, BPB Publishers
2. **Electrical Machines** -S.K. Battacharya
3. **Electric Machines** by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd edition, 2004.

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Electrical Machines Lab – I

Any Ten of the experiments are required to be conducted as compulsory experiments :

Experiment 1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.

Experiment 2.Load test on DC shunt generator. Determination of characteristics.

Experiment 3.Load test on DC series generator. Determination of characteristics.

Experiment 4.Load test on DC compound generator. Determination of characteristics.

Experiment 5.Hopkinson's test on DC shunt machines. Predetermination of efficiency.

Experiment 6.Brake test on DC shunt motor. Determination of performance curves.

Experiment 7.Swinburne's test and speed control of DC shunt motor. Predetermination of efficiencies.

Experiment 8.Brake test on DC compound motor. Determination of performance curves.

Experiment 9.Fields test on DC series machines. Determination of efficiency.

Experiment 10.Retardation test on DC shunt motor. Determination of losses at rated speed.

Experiment 11.Separation of losses in DC shunt motor.

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B.Tech. EEE	**L**	**T-P-D**	**C**
II Year - I Semester	**0**	**0-3-0**	**2**

Electronic Devices and Circuits Lab
(Common to EEE, ECE, CSE, IT & ECM)

PART A: (Only for Viva-\voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions) :

Experiment 1. Identification, Specifications, Testing of R, L, C Components (Color Codes),Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's
Experiment 2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
Experiment 3. Study and operation of

- Multimeters (Analog and Digital)
- Function Generator
- Regulated Power Supplies
- CRO.

PART B:
(For Laboratory Examination – Minimum of 10 experiments)
Experiment 1. Forward & Reverse Bias Characteristics of PN Junction Diode.
Experiment 2. Zener diode characteristics and Zener as voltage Regulator.
Experiment 3. Input & Output Characteristics of Transistor in CB Configuration.
Experiment 4. Input & Output Characteristics of Transistor in CE Configuration.
Experiment 5. Half Wave Rectifier with & without filters
Experiment 6. Full Wave Rectifier with & without filters
Experiment 7. FET characteristics
Experiment 8. Measurement of h parameters of transistor in CB, CE, CC configurations
Experiment 9. Frequency Response of CC Amplifier.
Experiment 10. Frequency Response of CE Amplifier.
Experiment 11. Frequency Response of Common Source FET amplifier
Experiment 12. SCR characteristics.
Experiment 13. UJT Characteristics

PART C:
Equipment required for Laboratories:
Experiment 1. Regulated Power supplies (RPS) - 0 -30 V
Experiment 2. CRO's - 0 - 20 MHz.
Experiment 3. Function Generators - 0 - 1 MHz.
Experiment 4. Multi meters
Experiment 5. Decade Resistance Boxes/Rheostats
Experiment 6. Decade Capacitance Boxes
Experiment 7. Ammeters (Analog or Digital) – 0 -20 μA, 0 -50μA, 0-100μA, 0-200μA, 0-10 mA.
Experiment 8. Voltmeters (Analog or Digital)-0-50V, 0-100V, 0-250V
Experiment 9. Electronic Components -Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, diodes Ge& Si type, Transistors –npn, pnp type

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Electrical Simulation Lab-I

Any Ten of the experiments are required to be conducted as compulsory experiments :

Experiment 1. Simulation of Mesh Analysis & Nodal Analysis
Experiment 2. Simulation of Thevenin's, Theorems
Experiment 3. Simulation of Norton's Theorems
Experiment 4. Simulation of Maximum Power Transfer Theorems
Experiment 5. Simulation of Superposition Theorems
Experiment 6. Simulation of Reciprocity theorem
Experiment 7. Simulation of Compensation Theorem ,
Experiment 8. Simulation of Millmann's Theorems
Experiment 9. Simulation of Locus Diagrams of RL and RC Series Circuits
Experiment 10. Simulation of Frequency response of Series and Parallel resonance circuits.
Experiment 11. Simulation of Z and Y Parameters
Experiment 12. Simulation of Transmission and hybrid parameters.

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Switching Theory and Logic Design

UNIT I
Number Systems & Codes
Philosophy of Number Systems, Complement Representation of Negative Numbers, Binary Arithmetic, Binary Codes, Error Detecting & Error Correcting Codes, Hamming codes.

UNIT II
Boolean Algebra and Switching Functions
Fundamental Postulates of Boolean Algebra, Basic theorems and Properties, Switching Functions, Canonical and Standard forms, Algebraic simplification Digital Logic Gates, Properties of XOR gates, Universal Gates, Multilevel NAND/NOR Realizations.

Minimization of Switching Functions : Map method, Prime implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime –Implicant chart, Simplification rules.

UNIT III
Combinational Logic Design
Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips, MUX Realization of switching functions Parity bit generator, Code-converters, Hazards and Hazard free Realizations.

Programmable Logic Devices & Threshold Logic : Basic PLD's-ROM, PROM, PLA, PAL, Realization of Switching functions using PLD's, Capabilities and Limitations of Threshold gate, Synthesis of Threshold functions, Multigate Synthesis.

UNIT IV
Sequential Circuits - I :Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples), Basic Flip-Flops, Triggering and Excitation tables, Steps in Synchronous Sequential Circuit Design, Design of modulo-N Ring & Shift counters, Serial binary adder, Sequence detector.

Sequential Circuits - II :Finite State Machine-Capabilities and Limitations, Mealy and Moore models, Minimization of Completely Specified and Incompletely Specified Sequential Machines, Partition Techniques and Merger chart methods, Concept of Minimal cover table.

UNIT V
Algorithmic State Machines: Salient features of the ASM chart, Simple examples, System design using data path and control subsystems, Control implementations, Examples of Weighing Machine and Binary multiplier.

Text Books :

1. **Switching & Finite Automata theory** – Zvi Kohavi, 2 ed., TMH.
2. **Digital Design** – Morris Mano, 3 ed., 2006, PHI.

References Books:

1. **Switching Theory and Logic Design** – A. Anand Kumar, 2008, PHI.
2. **Fundamentals of Logic Design** – Charles H. Roth, 5 ed., 2004, Thomson Publications.
3. **Digital Logic Applications and Design** – John M. Yarbrough, 2006, Thomson Publications.

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Electrical Machines II

UNIT – I

Transformers (Part-I)

Transformer principle-Need of Transformer-construction-types of transformers-EMF equation-core losses- Ideal Transformer, practical transformer on No-load-phasor diagram- Excitation phenomenon, practical Transformer on load-phasor diagrams Equivalent circuit - Inrush currents

UNIT – II

Transformers (Part-II)

Voltage Regulation-Dependency of voltage Regulation on load power factor-losses Efficiency-Condition for maximum efficiency- Testing of Transformers- Polarity Test - OC Test-SC Test-Sumpner's Test - Auto transformer- Power and Distribution Transformers differences-All day efficiency.

UNIT – III

Parallel Operation And Three Phase Transformers:

Parallel operation – conditions - problems - construction of three phase transformer Poly-phase connections Y/Y, Y/Δ,Δ/Y, Δ/Δ and open Δ, Zig-Zag Connections -Third harmonics in phase voltages-three winding transformers- Scott connection - On load tap changer, OFF load tap changer -cooling of a transformer.

UNIT – IV

Poly Phase Induction Motors (Part-I)

Three phase induction motors - construction – Types of rotors – Rotating Magnetic field – Principle of operation – Slip – Rotor frequency – Rotor Equivalent Circuit – Rotor Input – Mechanical Power developed- Complete equivalent circuit –Phasor 76 diagrams at starting and running conditions – Losses and power flow –Efficiency Torque Equation – Starting and maximum torque – Torque Slip Characteristics – Deep bar and double cage rotors.

UNIT – V

Poly Phase Induction Motors (Part-Ii)

Circle diagram: No load and Blocked rotor tests-Performance Analysis from circle diagram – starting of Induction motors – Different Starters – Speed control – Control from stator and rotor sides – Crawling and cogging -Induction Generator.

Text Books

1. Electrical machines by PS Bhimbra, Khanna Publishers.

2.**Electric machinery** by A.E. Fritzgerald, C.Kingsley and S.Umans, Mc Graw Hill Companies, 5th edition

References Books

1. Performance and Design of AC Machines by MG.Say, BPB Publishers

2. **Theory of Alternating Current Machinery** by Langsdorf, Tata McGraw-Hill Companies, 2nd edition.

3. Electric Machines by I.J.Nagrath and D.P.Kothari,Tata Mc Graw Hill, 7th Edition.2005

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Network Theory - II

UNIT-I

Three phase circuits:

Three phase circuits: Phase sequence- Star and delta connection-Relation between line and phase voltages and currents in balanced systems-Analysis of balanced and unbalanced 3 phase circuits-Measurement of active and reactive power.

UNIT-II

D.C Transient Analysis:

Transient response of R-L, R-C, R-L-C circuits (Series and parallel combination) for D.C excitation-Initial conditions-solution method using differential equation and Laplace transforms

A.C Transient Analysis:

Transient response of R-L, R-C, R-L-C circuits (Series and parallel combination) for sinusoidal excitations-Initial conditions-Solution method using differential equation and lap lace transforms

UNIT-III

Network Parameters:

Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations. Cascaded networks, concept of transformed network - 2port network parameters using transformed variables.

UNIT-IV

Filters:

Low pass, High pass, Band pass, Band elimination, Prototype filter design and numerical problems

UNIT-V

Network Functions:

The concept of Complex Frequency, Physical Interpretation of Complex Frequency, Transform Impedance and Transform Circuits, Series and parallel Combination of Elements, Terminal Pairs or Ports, Networks Functions for the One-port and Two-port, Poles and Zeros of Network Functions, Significance of poles and Zeros, Properties of Driving Point Functions, Properties of Transfer Functions, Necessary Conditions for Driving Point Functions, Necessary Conditions for Transfer Functions, Time Domain Response from Pole Zero Plot

Fourier analysis of A.C Circuits

The Fourier theorem, consideration of symmetry, exponential form of Fourier series, line spectra and phase angle spectra, Fourier integrals and Fourier transforms, properties of Fourier transforms.

Text Books:

1. **Electric circuits** by A.Chakrabarthy, Dhanipat Rai & Sons
2. **Circuits & Networks** by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill

Reference Books:

1. **Electric circuit analysis** by B. Subrahmanyam, I.K international Network Analysis by M.E Van Valkenberg.
2. **Electric circuit Analysis** by C.L. Wadhwa, New Age international
3. **Electric circuits** by David A. Bell, Oxford University press

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Power Systems - I

UNIT-I

Thermal Power Stations and Hydro Power Plants:

Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses.- Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers. Hydro Power Stations: Choice of site, working principle of Hydro power station.

UNIT-II

Gas and Nuclear Power Stations:

Nuclear Power Stations: Nuclear Fission and Chain reaction.- Nuclear fuels.- Principle of operation of Nuclear reactor.-Reactor Components: Moderators, Control rods, Reflectors and Coolants.- Radiation hazards: Shielding and Safety precautions.- Types of Nuclear reactors and brief description of PWR, BWR and FBR. Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only)

UNIT-III

Distribution Systems:

Classification of Distribution Systems - Comparison of DC Vs AC Distribution Systems - Requirements and Design features of Distribution Systems-Voltage Drop Calculations in D.C Distribution system for the following cases-Radial system - fed at one end - fed at both the ends for equal and unequal Voltages, Ring Main Distribution system. Voltage Drop Calculations in A.C. Distribution system for the following cases - Power Factors referred to receiving end voltage, with respect to respective load voltages, Numerical problems

Unit-IV

Substations:

Classification of substations: Air insulated substations: - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams. Gas insulated substations (GIS): – Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

Unit-V

Power factor and Voltage Control:

Causes of low p.f -Methods of Improving p.f -Phase advancing and generation of reactive KVAR using static Capacitors --Most economical p.f. for constant KW load and constant KVA type loads, Numerical Problems. Dependency of Voltage on Reactive Power flow.- Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers.

Economic Aspects of Power Generation:

Load curve and Load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems. Tariff Methods: Flat Rate, Block- Rate, two-part, three –part, and power factor tariff methods, effect of load factor, demand and diversity factors on the cost of electrical energy

Text Books

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai & Co. Pvt. Ltd., 1999.
2. Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND& COMPANY LTD., New Delhi 2004.

Reference Books

1. Elements of Power Station design and practice by M.V. Deshpande, Wheeler Publishing.
2. Electrical Power Systems by C.L.Wadhawa New age International (P) Limited, Publishers 1997.
3. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.

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Mechanics of Fluids And Hydraulic Machines

UNIT I

Fluid Statics:

Dimensions and units: physical properties of fluids- specific gravity, viscosity, surface tension- vapour pressure and their influence on fluid motion- atmospheric, gauge and vacuum pressures – measurement of pressure- Piezometer, U-tube and differential manometers.

UNIT II

Fluid Kinematics:

Stream line, path line and streak lines and stream tube, classification of flows-steady and unsteady, uniform and non uniform, laminar and turbulent, rotational and irrotational flows- equation of continuity for one dimensional flow and three dimensional flows.

Fluid Dynamics: Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT III

Closed conduit flow:

Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pitot tube, venturimeter, and orifice meter, Flow nozzle

Boundary Layer Concepts:

Definition, thicknesses, characteristics along thin plate, laminar and turbulent boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

UNIT IV

Basics of turbo machinery :

Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

Hydraulic Turbines :

Classification of turbines, Heads and efficiencies, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube theory- functions and efficiency.

Performance of hydraulic turbines : Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

UNIT V

Centrifugal pumps:

Classification, working, workdone – barometric head- losses and efficiencies specific speed-performance characteristic curves, NPSH.

Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

Text Books :

1. **Hydraulics, fluid mechanics and Hydraulic machinery** MODI and SETH.

2. **Fluid Mechanics and Hydraulic Machines** by Rajput.

References Books:

1. **Fluid Mechanics and Fluid Power Engineering** by D.S. Kumar, Kotaria & Sons.

2. **Fluid Mechanics and Machinery** by D. Rama Durgaiah, New Age International.

3. **Hydraulic Machines** by Banga & Sharma, Khanna Publishers.

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Electrical Circuits Lab

Any Ten of the experiments are required to be conducted as compulsory experiments :

Experiment 1. Verification of KCL & KVL
Experiment 2. Thevenin's, Norton's and Maximum Power Transfer Theorems
Experiment 3. Verification of Superposition theorem
Experiment 4. Verification of Compensation Theorem
Experiment 5. Verification of Reciprocity , Millman's Theorems
Experiment 6. Locus Diagrams of RL and RC Series Circuits
Experiment 7. Series and Parallel Resonance
Experiment 8. Determination of Self, Mutual Inductances and Coefficient of coupling
Experiment 9. Impedance and Admittance Parameters
Experiment 10. Transmission and hybrid parameters
Experiment 11. Measurement of Active Power for Star and Delta connected balanced loads
Experiment 12. Measurement of Reactive Power for Star and Delta connected balanced loads
Experiment 13. Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads

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Electrical Simulation Lab - II

Experiment 1. DC transient analysis of Electric circuit.
Experiment 2**.** AC transient analysis of Electric circuit.
Experiment 3. Two port network parameters – ABCD and Hybrid parameters
Experiment 4. Two port network parameters – Z, Y parameters.
Experiment 5. Poles and zeros for given transfer function.
Experiment 6. Determination of line and load currents in a three phase star/delta circuit.
Experiment 7. Power Measurement by 2 wattmeter method and calculation of phase angle
Experiment 8. Design of constant K low pass & high pass filter
Experiment 9. Design of constant K band pass & band elimination filters
Experiment 10. Star to Delta and Delta to star transformation.
Experiment 11. Measurement of mutual inductance in coupled coils.
Experiment 12. Reactive power Measurement using single wattmeter method.

Note: From the above list minimum 10 experiments are to be conducted.

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Electrical Machines – II Lab

Any Ten of the experiments are required to be conducted as compulsory experiments :

Experiment 1. O.C. & S.C. Tests on Single phase Transformer
Experiment 2**.**Sumpner's test on a pair of single phase transformers
Experiment 3. Brake test on three phase Induction Motor
Experiment 4. No-load & Blocked rotor tests on three phase Induction motor
Experiment 5. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods
Experiment 6.V and Inverted V curves of a three—phase synchronous motor.
Experiment 7. Equivalent Circuit of a single phase induction motor
Experiment 8. Determination of Xd and Xq of a salient pole synchronous machine
Experiment 9. Separation of core losses of a single phase transformer
Experiment 10. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
Experiment 11. Parallel operation of Single phase Transformer
Experiment 12. Scott connection of transformer
Experiment 13. Efficiency of a three-phase alternator
Experiment 14. Measurement of sequence impedance of a three-phase alternator

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Gender Sensitization
(Common to all branches)

UNIT - I:

Gender: Why should we study it?,

Socialization: Making women, Making Men, Introduction, Preparing For Womanhood, Growing up male, First lessons in caste, Different masculinities.

UNIT - II:
Housework: The Invisible Labour,
"My mother does not work", "Share the load", Missing Women: Sex Selection and Its Consequences, Declining sex ratio, Demographic consequences, Point of view, Gender and the structure of knowledge, Further reading : Unacknowledged women artists of Telangana, Sexual Harassment: Say No! Sexual harassment, not eve-teasing, Coping with everyday harassment, Further reading. "Chupulu"

UNIT - III:
Women's Work: Its Politics and Economics,
Fact and fiction, Unrecognized and unaccounted work, Further reading: Wages and conditions of work, Domestic Violence: Speaking Out, Is home a safe place?, When women unite [Film], Rebuilding lives, Further reading: New forums for justice.

UNIT - IV:
Whose History? Questions for Historians and Others,
Reclaiming a past, Writing other histories, further reading: Missing pages from modern Telangana history. Gender Spectrum: Beyond the Binary, Two or many?, Struggles with discrimination, Thinking about Sexual Violence, Blaming the victim, "I fought for my life…", Further reading: The caste face of violence.

UNIT - V:
Just Relationships: Being Together as Equals,
Mary kom and Onler, Love and acid just do not mix, Love letters, Mothers and fathers, Further Reading: Rosa Parks – The brave heart.

Text Books:

1. **Towards a world of equals** by A.Suneetha Susic Tharu publication Telugu academy Hyderabad.

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Electrical Machines – III

UNIT - I:
Fundamentals of Synchronous Generators
Constructional Features of round rotor and salient pole machines – Armature windings - Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation. Harmonics in generated e.m.f. - Suppression of harmonics – armature reaction - leakage reactance, synchronous reactance and impedance –phas or diagram – load characteristics.

UNIT - II:
Regulation of Synchronous Generators
Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A methods – salient pole alternators – two reaction analysis – experimental determination of Xd and Xq (Slip test) Phasor diagrams – Regulation of salient pole Alternators

UNIT - III:
Parallel Operation of Synchronous Generators
Synchronization of Alternators with infinite bus – Methods of Synchronization- synchronizing power and torque –Parallel operation and load sharing – Numerical Problems –Effect of change of excitation and mechanical power input. Short circuit Analysis – determination of sub-transient, transient and steady state reactances.

UNIT - IV:
Synchronous Motors
Construction and types of Synchronous Motors – Methods of Starting – Synchronous induction Motor. Variation of current and power factor with excitation control – phasor diagrams – V and Inverted V Curves. Synchronous condenser – Applications - Problems - Mathematical analysis for power developed. Excitation and power circles – hunting and its suppression.

UNIT - V:
Single Phase Motors-Constructional features.
Single phase induction motor – Double field revolving theory – split-phase – Capacitor start – Capacitor run motors - shaded pole motors. Principle and performance of A.C. Series motor-Universal motor, Stepper Motor.

Text Books:
1. **Electric Machines** by I.J.Nagrath and D.P.Kothari, Tata Mc Graw Hill Publishers, 7th Edition 2005.
2. **Electrical Machines** by P.S. Bimbra, Khanna Publishers.

Reference Books:
1. **The Performance and Design of A.C.Machines** by M.G.Say, ELBS and Ptiman and Sons.
2. **Electric Machinery** by A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw-Hill Companies, 5th edition, 1990.
3. **Theory of Alternating Current Machinery** by Langsdorf, Tata Mc Graw-Hill, 2nd edition.

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Control Systems

UNIT - I:
Mathematical Modeling of physical Control Systems-I
Basic elements of control system –Classification–Open and closed loop systems: Position Control Systems, Temperature control of a chamber, Liquid level control, Aircraft wing control system, Missile direction Control system, Boiler generator control systems, Sun tracking system – Transfer function– Mathematical Modeling of Electrical, Mechanical, electro mechanical Systems and Thermal Systems.

UNIT - II:
Mathematical Modeling of physical Control Systems-II
Mathematical modeling of Synchros – AC and DC servomotors– Block diagram Algebra– Signal flow graphs, Mason's gain Formula.
State variables–State variable representation of continuous time system–state equations– transfer function from state variable representation–Solutions of the state equations–Concepts of Controllability and observability and techniques to test them.

UNIT - III:
Time Domain Analysis of Control Systems
Introduction–Typical test signals–Step response analysis of second order systems– Transient response specifications– steady state error constants– Generalized error series– Effect of P, PI & PID Controllers.

UNIT - IV:
Stability & Root Locus Techniques
Concept of BIBO stability-absolute stability–Routh-Hurwitz criterion –Root Loci theory– Application to systems stability studies–Illustration of the effect of addition of a zero and a pole.

UNIT - V:
Frequency Domain Analysis & Design of Control Systems
Introduction– Polar plot –Nyquist stability criterion– Frequency domain indices (Gain margin, Phase margin and bandwidth) – Correlation between frequency and time response – Bode plot.
Need of Compensators–Design of lag and lead compensators using Bode plots–Applications

Text Books:

1. **'Control Systems Engineering',** I.J. Nagrath and M. Gopal, New Age International Publishers, 2007.
2. **Automatic Control systems, Pearson Education,** Benjamin C. Kuo, New Delhi, 2003.

Reference Books:

1. **K. Ogata, 'Modern Control Engineering'**, 4th edition, PHI, New Delhi, 2002.
2. **Norman S. Nise, Control Systems Engineering**, 4th Edition, John Wiley, New Delhi, 2007.
3. **Samarajit Ghosh, Control systems, Pearson Education**, New Delhi, 2004

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Power Systems - II

UNIT - I:

Transmission Line Parameters

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR and GMD, symmetrical and asymmetrical conductor configuration with and without transposition - Skin and Proximity effects - Numerical Problems.

Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines - Numerical Problems.

UNIT - II:

Performance Of Transmission Lines

Classification of Transmission Lines, Performance of Short, medium lines - Nominal-T, Nominal-□ and A, B, C, D Constants for symmetrical and Asymmetrical Networks - Numerical Problems.

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Representation of Long Lines - Equivalent-T and Equivalent-□ network models- Ferranti effect- Surge impedance and SIL of long lines, wave length and velocity of propagation of waves, - Numerical problems.

UNIT - III:

Power System Transients And Corona

Types of System Transients - Travelling wave theory - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions. Bewley's Lattice Diagrams-Numerical Problems.

Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference - Problems.

UNIT - IV:

Mechanical Design And Overhead Line Insulators

Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

Types of Insulators, String efficiency and Methods of improvement- Capacitance grading and Static Shielding - Numerical Problems.

UNIT - V:

Underground Cables

Construction, types of Insulating materials, Types of Cables, Insulation resistance, Capacitance of Single and 3-Core belted cables-Numerical Problems.

Grading of Cables - Capacitance grading, Description of Inter-sheath grading - Numerical Problems. Comparison of Over Head Lines and Under Ground Cables.

Text Books:

1. **Power System Engineering** by I.J.Nagarath and D.P.Kothari, Tata Mc Graw Hill.
2. **Electrical power systems** by C.L.Wadhwa, New Age International (P) Limited, Publishers, 1998.

Reference Books:

1. **Power system Analysis**-by John J Grainger William D Stevenson, TMC Companies, 4th edition
2. **Power System Analysis and Design** by B.R.Gupta, Wheeler Publishing.
3. **Modern Power system Analysis** by I.J.Nagrath and D.P.Kothari: Tata McGraw-Hill Publishing Company, 2nd edition.

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B.Tech. EEE	**L**	**T-P-D**	**C**
III Year – I Semester	**4**	**0-0-0**	**4**

Power Electronics

UNIT - I:
Power Semiconductor Devices
Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power MOSFET – Power IGBT and their characteristics
Basic theory and operation of SCR – Static and Dynamic characteristics of SCR - Salient points - Two transistor analogy - UJT firing circuit – Series and Parallel connections of SCRs - Snubber circuit details – Specifications and Ratings of SCRs, BJT, MOSFET, IGBT, Numerical problems, natural and forced commutation (Principle only).

UNIT - II:
Single Phase Controlled Converters
Single Phase Half Controlled Converters: Half controlled converters with R, RL and RLE loads – Derivation of average load voltage and current - without and with free-wheeling Diode – Numerical problems
Single Phase Fully controlled Converters: Midpoint and Bridge connections with R, RL and RLE loads- Derivation of average load voltage and current - Performance parameter of single phase full bridge converter, Effect of source inductance – Derivation of load voltage and current- Numerical problems.

UNIT - III:
Three Phase Controlled Converters
Three Phase Converters – Three pulse and six pulse converters – Midpoint and bridge connections, average load voltage with R and RL loads – Effect of Source inductance – Numerical Problems.

UNIT - IV:
A C Voltage Controllers
Single phase AC voltage controllers with R and RL loads-wave forms – Modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor – Numerical problems

Cyclo Converters
Cyclo converters – Single phase midpoint cyclo converters with Resistive and inductive load (Principle of operation only)-Bridge configuration of single phase cyclo converter (Principle of operation) – Wave forms

UNIT - V:
Choppers
Time ratio control and Current limit control strategies – Analysis of Buck and Boost converter with continuous mode of operation - Numerical Problems.
Inverters
Single phase inverter –half and full bridge inverter – Wave forms—performance parameters of inverters– Voltage control techniques for inverters, Pulse width modulation techniques-single, multiple and sinusoidal PWM Numerical Problems- Three Phase Inverters : analysis of 180 degree and 120 degree modes of operation with resistive, inductive loads - Numerical Problems.

Text Books:

1. **Power Electronics** by Mohammed H. Rashid, Pearson Education, Third Edition, First Indian reprint 2004.
2. **Power electronics** by P S Bimbhra, Khanna Publishers.

Reference Books:

1. **Fundamentals of Power electronics and Drives** by A.Chakrabarti, Dhanpat Rai & Co, 2008
2. **Power electronics,** by P C Sen, Tata McGraw-Hill Education.
3. **Power Electronics** by Ned Mohan, Tore M. Undeland and William P. Robbins, John Wiley and Sons, Second Edition.

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B.Tech. EEE	**L**	**T-P-D**	**C**
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IC Applications

UNIT I:
Integrated Circuits
Classification, Chip Size and Circuit Complexity, Ideal and Practical Op-Amp, Op-amp characteristics-DC and AC Characteristics, 741 Op-Amp and its Features, Concept of Virtual Ground ,Modes of operation-inverting, non-inverting, differential.

UNIT II:
Op-Amp Applications
Basic Applications of Op-Amp, Instrumentation Amplifier, AC Amplifier, V to I and I to V Converters, Sample & Hold Circuits, Differentiators and Integrators, Comparators, Schmitt Trigger, Multivibrators

UNIT III:
Active Filters & Oscillators
Introduction, First Order and Second Order Low Pass, High Pass and Band Pass Filters, Active Band Reject and All Pass Filters.
Principle of Operation and Types of Oscillators – RC, Wien Bridge and quadrature type. Waveform Generators – Triangular, Saw Tooth, Square Wave.

UNIT IV:
Timers & Phase Locked Loops
Introduction to 555 Timer, Functional Diagram, Monostable and Astable Operations and Applications, Schmitt Trigger, PLL - Introduction, Block Schematic, Principles and Description of Individual Blocks of 565, VCO. Introduction to Voltage Regulators Features of 723 Regulators.

UNIT V:
D-A And A- D Converters
Introduction, Basic DAC Techniques - Weighted Resistor Type, R-2R Ladder Type, Inverted R-2R Type. Different types of ADCs – Parallel Comparator Type, Counter Type, Successive Approximation Register Type and Dual Slope Type. DAC and ADC Specifications.

Text Books:
1. **Linear Integrated Circuits** –D. Roy Chowdhury, New Age International (p) Ltd, 3rd Ed., 2008.
2. **Digital Fundamentals** – Floyd and Jain, Pearson Education,8th Edition, 2005.

Reference Books:
1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 1987.
2. Modern Digital Electronics – RP Jain – 4/e – TMH, 2010.
3. Op-Amps and Linear Integrated Circuits – Concepts and Applications by James M.Fiore, Cengage/ Jaico, 2/e, 2009.

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B.Tech. EEE	**L**	**T-P-D**	**C**
III Year – I Semester	**3**	**0-0-0**	**3**

Renewable Energy Sources

UNIT - I:
Principles Of Solar Radiation
Role and Potential of New and Renewable source, the solar energy option, Environmental impact of solar power, Physics of the Sun, The solar constant, Extraterrestrial and Terrestrial solar radiation, and Solar radiation on titled surface, Instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT - II:
Solar Energy Collection, Storage & Applications
Flat Plate Collectors and Concentrating Collectors, Classification of concentrating collectors, Orientation and Thermal analysis, advanced collectors, different solar energy storage methods: Sensible, latent heat and stratified storage. Solar ponds, Solar Energy Applications - solar heating/cooling techniques, solar distillation and drying, Photovoltaic Energy Conversion.

UNIT - III:
Wind Energy
Sources and potentials, Horizontal and Vertical axis wind mills - Types, Blade Design, Performance characteristics, Betz criteria, Induction Generators for Wind power Generation, MHD Generation

UNIT - IV:
Bio-Mass & Direct energy conversion.
Principles of Bio-Conversion, Anaerobic/aerobic digestion, Types of Bio-gas Digesters, gas yield, Combustion characteristics of bio-gas, Utilization for cooking I.C engine operation and Economic aspects.
Direct Energy Conversion: Need for DEC, Principles of DEC, Carnot Cycle and Limitations.

UNIT - V:
Harnessing Geothermal Energy & Ocean Energy
Resources of Geothermal Energy, Types of wells, Methods of harnessing the energy, potential in India, Ocean Thermal Energy Conversion, Principles, Utilization, Setting of OTEC plants, Thermodynamic cycles, Tidal and Wave energy: Potential and Conversion Techniques, Mini-Hydel Power plants.

Text Books:

1. Non-Conventional Energy Sources by G.D.Rai, Khanna Publishers.
2. Renewable Energy Resources by Twidell and Wier, CRC Press (Taylor and Francis).

Reference Books:

1. Renewable Energy Resources by Tiwari and Ghosal, Narosa.
2. Renewable Energy Technologies by Ramesh and Kumar, Narosa.
3. Non-Conventional Energy Systems by K Mittal, Wheeler Publishing House.

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B.Tech. EEE	**L**	**T-P-D**	**C**
III Year – I Semester	**3**	**0-0-0**	**3**

Intellectual Property Rights

UNIT - I:
Introduction to Intellectual property:
Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II:
Trade Marks:
Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT - III:
Law of copy rights:
Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV:
Trade Secrets:
Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.
Unfair competitiion: Misappropriation right of publicity, False advertising.

UNIT - V:
New development of intellectual property:
New developments in trade mark law; copy right law, patent law, intellectual property audits.
International overview on intellectual property, international - trade mark law, copy right law, international patent law, and international development in trade secrets law.

Text Books:
1. **Intellectual property right,** Deborah, E. Bouchoux, cengage learning.
2. **Intellectual property right - Unleashing the knowledge economy,** prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

Reference Books:
1. **Managing Intellectual Property-The Strategic Imperative, Second Edition** by Vinod V.Sople, PHI.
2. **Intellectual Property –Copyrights, Trademarks and patents** by Richard Stim, Cengage Learning.

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B.Tech. EEE	**L**	**T-P-D**	**C**
III Year – I Semester	**3**	**0-0-0**	**3**

Cyber Security

UNIT - I:
Introduction: Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime: Social Engineering, Categories of Cyber Crime, Property Cyber Crime. CYBER CRIME ISSUES: Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation ,Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses. Security Policy Design, Designing Security Procedures, Risk Assessment Techniques, Security standards, Biba Model, Chinese wall, Bell La Pedula Model.

UNIT - II:
Service Delivery Process- Service Delivery Process, Service Level Management, Financial Management, Service Management, Capacity Management, Availability Management.
Service Support Process- Service Support Process, Configuration Management, Incident Management, Problem Management, Change Management, Release Management.

UNIT - III:
Storage Management- Backup & Storage, Archive & Retrieve, Disaster Recovery, Space Management, Database & Application Protection, Bare Machine Recovery, Data Retention
Security Management- Security, Computer and internet Security, Physical Security, Identity Management, Access Management. Intrusion Detection, Security Information Management.

UNIT - IV:
Cyber Forensics-
Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics Evaluation of crime scene and evidence collection ,Usage of tools for disk imaging and recovery processes.

UNIT - V:
Introduction to information security standards , laws and acts:
Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC , Electronic Communication Privacy ACT, Legal Policies,ISO 27001,PCI DSS,IT Act, Copy Right Act.

Text Books:

1. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.
2. "Management of Information Security", M. E. Whitman, H. J. Mattord, Nelson Education / CENGAGE Learning, 2011, 3rd Edition.

Reference Books:

1. **"Guide to Computer Forensics and Investigations",** B. Nelson, A. Phillips, F. Enfinger, C. Steuart, Nelson Education / CENGAGE Learning, 2010, 4th Edition.
2. **Goel Ritendra, Computer Application in Management**, New Age International Publishers, New Delhi.
3. **Chowdhury G.G., Text Retrieval Systems in information Management**, New Age International Publishers, New Delhi

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B.Tech. EEE	**L**	**T-P-D**	**C**
III Year – I Semester	**0**	**0-3-0**	**2**

Mechanics of Fluids And Hydraulic Machines Lab

Experiment 1. Impact of jets on Vanes.

Experiment 2**.** Performance Test on Pelton Wheel.

Experiment 3. Performance Test on Single Stage Centrifugal Pump.

Experiment 4. Performance Test on Multi Stage Centrifugal Pump.

Experiment 5. Performance Test on Reciprocating Pump.

Experiment 6. Calibration of Venturimeter.

Experiment 7. Calibration of Orifice meter.

Experiment 8. Determination of friction factor for a given pipe line.

Experiment 9. Determination of loss of head due to sudden contraction in a pipeline.

Experiment 10. Verification of Bernoulli's Theorems

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III Year - I Semester	**0**	**0-3-0**	**2**

Control Systems & Simulation Lab

Any Eight of the following experiments are to be conducted:

Experiment 1. Time response of Second order system
Experiment 2. Characteristics of Synchros
Experiment 3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
Experiment 4**.** Effect of feedback on DC servo motor
Experiment 5**.** Transfer function of DC motor
Experiment 6. Effect of P, PD, PI, PID Controller on a second order systems
Experiment 7. Lag and lead compensation – Magnitude and phase plot
Experiment 8. Transfer function of DC generator
Experiment 9. Temperature controller using PID controller.
Experiment 10. Characteristics of Magnetic amplifiers
Experiment 11. Characteristics of AC servo motor

Any two simulation experiments are to be conducted:-

Experiment 1. Simulation of Op-Amp based Integrator and Differentiator circuits.

Experiment 2. Simulation of Linear system (Time domain analysis, Error analysis).

Experiment 3. Simulation of Stability (Bode, Root Locus, Nyquist) of Linear Time Invariant system.

Experiment 4. Simulation of State space model for classical transfer function and verification.

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Synchronous Machines & Simulation Lab

Any Ten of the experiments are required to be conducted as compulsory experiments :

Experiment 1. Determination of Sequence Impedances of a Cylindrical Rotor Synchronous Machine.
Experiment 2. Single Line to Ground fault (L-G). analysis of Cylindrical Rotor Synchronous Machine
Experiment 3. Line to Line fault (L-L) analysis of Cylindrical Rotor Synchronous Machine
Experiment 4**.** Double Line to Ground fault (L-L-G) analysis of Cylindrical Rotor Synchronous Machine
Experiment 5. Triple Line to Ground fault (L-L-L-G) analysis of Cylindrical Rotor Synchronous Machine
Experiment 6. Determination of Sub-transient reactance's of a Salient Pole Synchronous Machine.
Experiment 7. Power angle characteristics of Salient pole. Alternator.
Experiment 8. Step response of rotor angle and generator frequency of a Synchronous Machine
Experiment 9. Three phase short circuit analysis in a Synchronous Machine
Experiment 10. Transformer fault analysis, LG, LL, 3-Φ faults and also using PSIM.
Experiment 11. Optimal dispatch including Losses
Experiment 12. Optimal dispatch neglecting Losses

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Power Semi Conductor Drives

UNIT - I:
Control Of Dc Motors By Single Phase And Three Phase Converters

Introduction to Thyristor controlled Drives, Single Phase semi and Fully controlled converters connected to d.c separately excited and d.c series motors – continuous current operation – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics- Problems on Converter fed d.c motors.

Three phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque characteristics – Problems.

UNIT - II:
Four Quadrant Operation Of Dc Drives

Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.C motors by single phase and three phase dual converters – Closed loop operation of DC motor (Block Diagram Only)

Control Of Dc Motors By Choppers

Single quadrant, Two quadrant and four quadrant chopper fed dc separately excited and series motors – Continuous current operation – Output voltage and current wave forms – Speed and torque expressions – speed-torque characteristics – Problems on Chopper fed D.C Motors – Closed Loop operation (Block Diagram Only)

UNIT - III:
Control Of Induction Motor Through Stator Voltage And Stator Frequency

Variable voltage characteristics-Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics.

Variable frequency characteristics-Variable frequency control of induction motor by Voltage source and current source inverter and cyclo converters- PWM control – Comparison of VSI and CSI operations – Speed torque characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives (Block Diagram Only)

UNIT - IV:
Rotor Side Control Of Induction Motor

Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages, applications, problems.

UNIT - V:
Control Of Synchronous Motors

Separate control and self control of synchronous motors – Operation of self controlled synchronous motors by VSI, CSI and cycloconverters. Load commutated CSI fed Synchronous Motor – Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control - Cyclo converter, PWM based VSI & CSI.

Text Books:

1. **Fundamentals of Electric Drives** by G K Dubey, Narosa Publications.
2. **Electric motor drives - modeling, Analysis and control** by R.Krishnan, Prentice Hall PTR, 2001

Reference Books:

1. **A First course on Electrical Drives** – S K Pillai New Age International (P) Ltd. 2nd Edition.
2. **Thyristor DC Drives** by P.C.Sen, Wiley-Blackwell, 1981
3. **Modern Power Electronics and AC Drives** by B.K.Bose, PHI.

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B.Tech. EEE	**L**	**T-P-D**	**C**
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Electrical Measurements

UNIT - I:
Analog Ammeters ,Voltmeters and instrument transformers
Classification of analog instruments–PMMC and MI Instruments: Principle, construction, Torque equation, Range Extension, Effect of temperature, Errors, advantages and disadvantages.
Current Transformer and Potential Transformer: Construction, theory, Phasor diagram, Errors, testing and applications.

UNIT - II:
Wattmeter , Power factor meter and frequency meters
Electro dynamo meter type Wattmeter: Construction, Theory, Shape of scale, errors–Low power factor wattmeter– Three phase wattmeter – Measurement of active and reactive power in single phase and three phase.
Single phase and three phase electro dynamometer type and MI type power factor meters – Electrical resonance and Weston type frequency meters.

UNIT - III:
Energy meter and potentiometers
Single phase induction type energy meter: Construction, theory, operation, errors, compensations – Maximum demand indicators–Measurement of VAH, VARh.
Basic Potentiometer–Standardization–Crompton's Potentiometer–Polar type and coordinate type AC potentiometers–Applications of DC& AC potentiometer.

UNIT - IV:
DC & AC Bridges
Classification of resistances–Wheatstone bridge–Sensitivity of Wheatstone bridge–Limitations–Carey foster slide wire bridge–Kelvin's Double bridge–Difficulties in measurement of high resistances–loss of charge method–Megohm bridge method–measurement of earth resistances.
Measurement of Inductance and capacitances: Maxwell's Bridge–Anderson's Bridge–Hays Bridge–Owen's Bridge–Desauty's Bridge–Schering bridge.
Measurement of Mutual inductance: Campbell's Heaviside bridge–Carey foster bridge–Campbell's bridge–Measurement of frequency: Wien's Bridge

UNIT - V:
Magnetic Measurements
D'Arsonval galvanometer, Ballistic and flux meters: Construction, Theory, Operation. Ballistic Tests–Measurement of flux density, magnetizing force–Determination of B-H Curve–Hysteresis loop.

Text Books:

1. **A.K.Sawhney: A course in Electrical and Electronic Measurements and Instrumentation**, Edition 19, Danapathi Rai and Sons, 2007.
2. **E.W. Golding & F.C.Widdis, 'Electrical Measurements & Measuring Instruments'**, A.H.Wheeler & Co, 2001

Reference Books:

1. **J.B.Gupta: A course in Electrical and Electronic Measurements and Instrumentation**, 13/E, Kataria and sons,2009
2. **S.K.Singh, 'Industrial Instrumentation and control',** Tata McGraw Hill, 2nd edn. 2002.
3. **H.S.Kalsi, 'Electronic Instrumentation'**, Tata McGraw Hill, 2004.

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Computer Methods In Power Systems

UNIT - I:
Power System Network Matrices-1

Graph Theory: Definitions, Bus Incidence Matrix, Y_{bus} formation by Direct and Singular Transformation Methods, Numerical Problems. Power System Network Matrices-2
Formation of Z_{Bus}: Partial network, Algorithm for the Modification of Z_{Bus} Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).- Modification of Z_{Bus} for the changes in network (Problems

UNIT - II:
Power flow Studies-1
Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.
Power flow Studies-2
Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution with or without PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart.
Decoupled and Fast Decoupled Methods. - Comparison of Different Methods – DC load Flow

UNIT - III:
Short Circuit Analysis-1
Per-Unit System of Representation. Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems.
Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems.
Short Circuit Analysis-2
Symmetrical Component Theory: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances.
Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems.
Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems

UNIT - IV:
System Steady State Stability Analysis
Elementary concepts of Steady State, Dynamic and Transient Stabilities.
Description of: Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

UNIT - V:
Power System Transient State Stability Analysis
Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation.- Solution of Swing Equation: Point-by-Point Method. Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

Text Books:

1. Power system Analysis Operation and control, Abhijit Chakrabarthi , Sunita Haldar, 3 ed , PHI,2010.
2. Modern Power system Analysis – by I.J.Nagrath & D.P.Kothari: Tata McGraw-Hill Publishing company, 2nd edition

Reference Books:

1. Computer Techniques in Power System Analysis by M.A.Pai, TMH Publications
2 Power System Analyses by Grainger and Stevenson, Tata McGraw Hill.
3.Computer techniques and models in power systems, By K.Uma rao, I.K.International

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Microprocessors And Microcontrollers

UNIT-I:
8086 Architecture:
8086 Architecture-Functional diagram, Register organization, memory segmentation, programming model, memory addresses, physical memory organization, architecture of 8086, signal descriptions of 8086-common function signals, Timing diagrams, interrupts of 8086.

UNIT-II:
Instruction set and assembly language programming of 8086:
Instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT-III:
I/O Interface:
8255 PPI, Various modes of operation and interfacing to 8086, interfacing keyboard, Display, D/A and A/D converter.
Interfacing with advanced devices: memory interfacing to 8086 interrupt structure of 8086, vector interrupt table, interrupts service routine.
Communication interface: serial communication standards, serial data transfer schemes, 8251 USART architecture and interfacing.

UNIT-IV:
Introduction to Microcontrollers:
Overview of 8051 microcontroller, architecture, I/O ports, memory organization, addressing modes and instruction set of 805, simple programs.

UNIT-V:
8051 Real Time control:
Programming time interrupts, programming external hardware interrupts, and programming the serial communication interrupts, programming 8051 Timers and counters.

Text Books:

1. **D.V.Hall, Microprocessors and interfacing,** TMGH,2nd Edition 2006.

2. **Kenneth.J.Ayala, The 8051 Microcontroller**, 3rd Ed., Engage Learning.

Reference Books:

1. **Advanced Microprocessors and peripherals**-A.K.Ray and K.M Bhurchandani, TMH,2 nd Edition 2006.

2. **The 8051 Microcontrollers. Architecture and programming and applications**- K.Uma Rao, Andhe Pallavi, Pearson, 2009.
3. **Micro computer system 8086/8088 family architecture. Programming and design**-Du and GA Gibson, PHI 2nd Edition.

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Utilization of Electrical Energy

UNIT - I:
Illumination:
Illumination: Definitions, types of lighting schemes, Incandescent lamps and fluorescent lamps polar curves, effect of voltage variation on efficiency and life of lamps, Distribution andcontrol of light, lighting calculations, solid angle, Laws of Illumination-calculations, discharge lamps: Sodium Vapour and Mercury Vapour Lamps, merits of LED Lamps - Illumination Design – Indoor lighting, factory lighting, flood lighting and street lighting-problems.

UNIT - II:
Heating And Welding:
Electrical heating-advantages, methods and applications, Resistance heating, design of heating element, efficiency calculations. Induction heating: Core type and Core less furnaces and high frequency eddy current heating, dielectric heating: principle and applications - Problems, Arc furnaces: Direct arc and Indirect arc furnaces-Problems. Electric welding- types, merits and demerits.

UNIT - III:
Electric Drives:
Introduction to Electric vehicle, Types of electric drives, choice of motor, starting and running characteristics, speed control, Methods of Electric Braking: Plugging, Rheostatic and Regenerative Braking. Temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT - IV:
Electric Traction (Part – I):
Traction Systems: types, Electric traction. Modern 25 KV A.C. single phase traction systems: advantages, equipment and layout of 25 KV single phase A.C. traction system.
Simplified speed time curves, Average and scheduled speed - Quadrilateral and Trapezoidal speed time curves-Problems.

UNIT - V:
Electric Traction (Part – II):
Mechanics of train movement: Adhesive Weight, coefficient of Adhesion, attractive effort and specific energy consumption, factors affecting specific energy consumption-problems.

Text Books:
1. **Utilization of Electric Energy** by E. Openshaw Taylor, Orient Longman private limited, 1971.
2. **Art & Science of Utilization of electrical Energy** by Partab, Dhanpat Rai & Sons.

Reference Books:
1. **Utilization of Electrical Power including Electric drives and Electric traction** by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. **Generation, Distribution and Utilization of electrical Energy** by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.
3. **Utilization of Electrical Power** by J.B.Gupta, Kataria publishers.

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Digital Control Systems

UNIT - I:

Sampling And Reconstruction:

Introduction, sample and hold operations, sampling theorem, Reconstruction of original sampled signal to continuous –time signal.

The Z – Transforms

Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms, Modified Z- Transforms

Z-Plane Analysis Of Discrete-Time Control System

Transform method for solving difference equations; Pulse transfer function, Pulse transfer function of closed loop system, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane: primary strips and complementary strips.

UNIT - II:

State Space Analysis

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations

Controllability and Observability

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function

UNIT - III:

Stability Analysis

Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion. Stability analysis using Liapunov theorems

UNIT - IV:

Design Of Discrete Time Control System By Conventional Methods

Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers. Design of digital control through deadbeat response method.

UNIT - V:

State Feedback Controllers And Observers

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order and Reduced order observers.

Linear Quadratic Regulators

Introduction to adaptive controls, Min/Max principle**,** Linear Quadratic Regulators,Kalman state estimation through Kalman filter.

Text Books:

1. **Discrete-Time Control systems** - K. Ogata, Pearson Education/PHI, 2nd Edition
2. **Digital Control and State Variable Methods** by M.Gopal, TMH

Reference Books:

1. **Digital Control Systems,** Kuo, Oxford University Press, 2nd Edition, 2003.
2. **Digital Control Engineering**, M.Gopal, New age international publisher

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B.Tech. EEE	**L**	**T-P-D**	**C**
III Year – II Semester	**3**	**0-0-0**	**3**

Energy Auditing Conservation and Management

UNIT - I:

Energy audit- definitions, concept ,

Types of audit, energy index, cost index ,pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit

UNIT - II:

Energy Management

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting- Energy manger, Qualities and functions, language, Questionnaire - check list for top management

UNIT - III:

Energy efficient Motors

Energy efficient motors, factors affecting efficiency, loss distribution, constructional details, characteristics - variable speed, variable duty cycle systems, RMS hp- voltage variation-voltage unbalance- over motoring- motor energy audit

UNIT - IV:

Power Factor Improvement, Lighting and energy instruments

Power factor – methods of improvement, location of capacitors, p.f with non-linear loads, effect of harmonics on p.f. , p.f motor controllers - Good lighting system design and practice, lighting control, lighting energy audit - Energy Instruments- watt meter, data loggers, thermocouples, pyrometers,lux meters, tongue testers ,application of PLC's

UNIT - V:

Economic aspects and analysis

Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis- Energy efficient motors- calculation of simple payback method, net present worth method- Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.

Text Books:

1. **Energy management** by W.R. Murphy & G. Mckay Butter worth, Heinemann publications.
2. **Energy management** by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998

Reference Books:

1. **Energy efficient electric motors** by John .C. Andreas, Marcel Dekker Inc Ltd- 2nd edition, 1995-
2. **Energy management handbook** by W.C.Turner, John wiley and sons
3. **Energy management and good lighting practice: fuel efficiency**- booklet12- EEO

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Power Electronics and Simulation Lab

Any Eight of the Experiments in Power Electronics Lab

Experiment 1. Study of Characteristics of SCR, MOSFET & IGBT

Experiment 2. Gate firing circuits for SCR's

Experiment 3. Single Phase AC Voltage Controller with R and RL Loads

Experiment 4. Single Phase fully controlled bridge converter with R and RL loads

Experiment 5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E)

Experiment 6. DC Jones chopper with R and RL Loads

Experiment 7. Single Phase Parallel, inverter with R and RL loads

Experiment 8. Single Phase Cycloconverter with R and RL loads

Experiment 9. Single Phase Half controlled converter with R load

Experiment 10. Three Phase half controlled bridge converter with R-load

Experiment 11. Single Phase series inverter with R and RL loads

Experiment 12. Single Phase Bridge converter with R and RL loads

Experiment 13. Single Phase MC Murry Bed fort inverter.

Any two simulation experiments

Experiment 1. Simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.
Experiment 2. Simulation of resonant pulse commutation circuit and Buck chopper.
Experiment 3. Simulation of single phase Inverter with PWM control.

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Microprocessors and Microcontrollers Lab

List of Experiments:

The Following programs/experiments are to be written for assembler and execute the same with 8086 and 8051 kits.

Experiment 1. Programs for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).
Experiment 2. Program for sorting an array for 8086.
Experiment 3. Program for searching for a number or character in a string for 8086.
Experiment 4. Program for string manipulations for 8086.
Experiment 5. Program for digital clock design using 8086.
Experiment 6. Interfacing ADC and DAC to 8086.
Experiment 7. Parallel communication between two microprocessors using 8255.
Experiment 8. Serial communication between two microprocessor kits using 8251.
Experiment 9. Interfacing to 8086 and programming to control stepper motor.
Experiment 10. Programming using arithmetic, logical and bit manipulation instructions of 8051.
Experiment 11. Program and verify Timer/ Counter in 8051.
Experiment 12. Program and verify Interrupt handling in 8051
Experiment 13. UART Operation in 8051.
Experiment 14. Communication between 8051 kit and PC.
Experiment 15. Interfacing LCD to 8051.
Experiment 16. Interfacing Matrix/ Keyboard to 8051.
Experiment 17. Data Transfer from Peripheral to Memory through DMA controller 8237 / 8257.

Note: - Minimum of 12 experiments to be conducted.

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Computer Methods in Power Systems and Simulation Lab

Any Ten of the experiments are required to be conducted as compulsory experiments :

Experiment 1. Determination of line performance when loaded at receiving end
Experiment 2. Formation of bus Admittance matrix
Experiment 3. Load flow Solution using Gauss Seidel Method
Experiment 4. Load flow solution using Newton Raphson method in Rectangular Coordinates
Experiment 5. Unsymmetrical Fault Analysis
Experiment 6. Zbus Building Algorithm
Experiment 7. Obtain Symmetrical components of a set of Unbalanced currents
Experiment 8. Obtain the original Unbalanced phase voltages from Symmetrical Components
Experiment 9. Short Circuit Analysis of 14 bus system.
Experiment 10. Load Frequency control of a single area system
Experiment 11. Load frequency control of a two area system.
Experiment 12. Transient Response of an RLC Circuit

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Instrumentation

UNIT - I:

Characteristics of Signals:

Measuring Systems, Performance Characteristics, – Static characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Statistical Analysis of Random Errors.
Signals and their representation

Signal and their representation: Standard Test, periodic, aperiodic, modulated signal, sampled data, pulse modulation and pulse code modulation

UNIT - II:
Oscilloscope:
Cathode ray oscilloscope-Cathode ray tube-time base generator-horizantal and vertical amplifiers-CRO probes-applications of CRO-Measurement of phase and frequency-lissajous patterns-Sampling oscilloscope-analog and digital type.
Digital voltmeters
Digital voltmeters- Successive approximation, ramp, dual-Slope integration continuos balance type-Microprocessor based ramp type DVM digital frequency meter-digital phase angle meter.

UNIT - III:
Signal Analyzers:
Wave Analyses - Frequency selective analyzers, Heterodyne, Application of Wave analyzers-Harmonic Analyzers, Total Harmonic distortion, spectrum analyzers, Basic spectrum analyzers, spectral displays, vector impedance meter, Q meter. Peak reading and RMS voltmeters.

UNIT - IV:
Transducers:
Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of resistor, inductor, LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermostats, Thermocouples, Synchros, Piezo electric transducers, photovoltaic, photo conductive cells, photo diodes.

UNIT - V:
Measurement of Non-Electrical Quantities-I:
Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque.
Measurement of Non-Electrical Quantities-II:
Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

Text Books:

1. **Transducers and Instrumentation** by D.V.S Murthy, Prentice Hall of India
2. **A course in Electrical and Electronic Measurements and Instrumentation**, A.K. Sawhney, Dhanpatrai& Co.

Reference Books:

1. **Measurements Systems, Applications and Design** – by D O Doeblin
2. **Principles of Measurement and Instrumentation** – by A.S Morris, Pearson /Prentice Hall of India
3. **Electronic Instrumentation**-by H.S.Kalsi Tata MCGraw-Hill Edition, 1995.

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Power System Operation and Control

UNIT - I:

Economic Operation Of Power Systems:

Optimal operation of Generators in Thermal Power Stations, - heat rate Curve – Cost Curve – Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation with line losses neglected, Unit commitment.

Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula.

UNIT - II:

Hydrothermal Scheduling:

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, Scheduling problems-Short term hydrothermal scheduling problem.

Modeling of Turbine:

First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models.

UNIT - III:

Modeling Of Governor And Automatic Controllers:

Modeling of Governor: Mathematical Modeling of Speed Governing System – Derivation of small signal transfer function.

Modeling of Excitation System:

Fundamental Characteristics of an Excitation system, Transfer function, Block Diagram Representation of IEEE Type-1 Model.

UNIT - IV:

Single Area Load Frequency Control

Necessity of keeping frequency constant. Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case.

Two-Area Load Frequency Control

Load frequency control of 2-area system – uncontrolled case and controlled case, tie- line bias control. Proportional plus Integral control of single area and its block diagram representation, steady state response –Automatic Generation Control and Economic dispatch control.

UNIT - V:

Reactive Power Control

Overview of Reactive Power control – Reactive Power compensation in transmission systems – advantages and disadvantages of different types of compensating equipment for transmission systems; load compensation – Specifications of load compensator, Uncompensated and compensated transmission lines: shunt and Series Compensation.

Text Books:

1. **Modern Power System Analysis** – by I.J.Nagrath and D.P.Kothari Tata M Graw – Hill Publishing Company Ltd, 2nd edition.
2. **Electrical Power Systems** by C.L.Wadhwa, Newage International-3rd Edition

Reference Books:

1. **Power System Analysis and Design** by J.Duncan Glover and M.S.Sarma., THOMPSON, 3rd Edition.
2. **Power System Analysis** by Grainger and Stevenson, Tata McGraw Hill.
3. **Power System Analysis** by Hadi Saadat , TMH Edition.

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High Voltage Engineering

UNIT - I:

Introduction To High Voltage Technology And Applications

Electric Field Stresses, Gas / Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

UNIT - II:

Break Down In Gaseous And Liquid Dielectrics

Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids.

Break Down In Solid Dielectrics

Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT - III:

Generation Of High Voltages And Currents

Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

Measurement Of High Voltages And Currents

Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

UNIT - IV:

Over Voltage Phenomenon And Insulation Co-Ordination

Natural causes for over voltages – Lightning phenomenon, Overvoltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems.

UNIT - V:

Non-Destructive Testing Of Material And Electrical Apparatus

Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.

High Voltage Testing Of Electrical Apparatus

Testing of Insulators and bushings, Testing of Isolators and circuit breakers, Testing of cables, Testing of Transformers, Testing of Surge Arresters, and Radio Interference measurements.

Text Books:

1. **High Voltage Engineering** by M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition
2. **High Voltage Engineering: Fundamentals** by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition.

Reference Books:

1. **High Voltage Engineering** by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
2. **High Voltage Insulation Engineering** by Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited, 1995.
3. **High Voltage Engineering, Theory and Practice** by Mazen Abdel Salam, Hussein Anis, Ahdan El-Morshedy, Roshdy Radwan , Marcel Dekker

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Switch Gear and Protection

UNIT - I:

Circuit Breakers-1:

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restricking Voltage and Recovery voltages.- Restriking Phenomenon, Average and Max. RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications: Types and Numerical Problems. – Auto reclosures.

Circuit Breakers-2:

Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT - II:

Electromagnetic and Static Relays:

Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays. Relays Classification: Instantaneous, DMT and IDMT types.

Application of relays: Over current/ Under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays. Universal torque equation, Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison. Static Relays: Static Relays verses Electromagnetic Relays

UNIT - III:

Generator Protection:

Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.

Transformer Protection:

Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholtz relay Protection.

UNIT - IV:

Feeder and Bus-Bar Protection:

Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay. Protection of Bus bars – Differential protection.

Neutral Grounding:

Grounded and Ungrounded Neutral Systems.- Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance - Arcing Grounds and Grounding Practices.

UNIT - V:

Protection against over voltages:

Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics.

Text Books:

1. **Switchgear and Protection** – by Sunil S Rao, Khanna Publlishers
2. **Power System Protection and Switchgear** by Badari Ram , D.N Viswakarma, TMH Publications

Reference Books:

1. **Transmission network Protection** by Y.G. Paithankar, Taylor and Francis, 2009.
2. **Power system protection and switch gear** by Bhuvanesh Oza, TMH, 2010.
3. **Electrical Power Systems** – by C.L.Wadhwa, New Age international (P) Limited, Publishers, 3nd editon

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Flexible A C Transmission Systems

UNIT - I:
Facts Concepts:
Transmission interconnections power flow in an AC system, loading capability limits, Dynamic stability considerations, importance of controllable parameters, basic types of FACTS controllers, and benefits from FACTS controllers.

UNIT - II:
Voltage Source Converters:
Single phase, three phase full wave bridge converters transformer connections for 12 pulse operation. Three level voltage source converter, pulse width modulation converter, basic concept of current source Converters, and comparison of current source converters with voltage source converters.

UNIT - III:
Static Shunt Compensation
Objectives of shunt compensation, midpoint voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, Methods of controllable var generation, variable impedance type static var generators, switching converter type var generators and hybrid var generators.

UNIT - IV:
SVC And STATCOM:
SVC: FC-TCR and TSC-TCR STATCOM:
The regulation and slope. Comparison between SVC and STATCOM

UNIT - V:
Static Series Compensators:
Objectives of Series compensation, concept of series capacitive compensation, GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC) control schemes for GSC TSSC and TCSC.

Text Books:

1. **Utilization Understanding FACTS Devices** by N.G. Hingorani and L. Guygi. IEEE Press Publications 2000.
2. **Flexible AC Transmission System** by Yong- Hua Song, Allan Johns, IEE Press.

Reference Books:

1. **Introduction to FACTS Controllers** by Kalyan K.Sen and meyling sen, John wiley & sons, Inc., Hoboken, New Jersey. Mohamed E.EI – Hawary, Series editor.
2. **FACTS controllers in power transmission and distribution** by K.R Padiyar, Motilal UK Books of India (2007).

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Modern Power Electronics

UNIT - I:
Modern Power Semiconductor Devices:
Modern power semiconductor devices – MOS Turn Off Thyristor (MTO) – Emitter Turn Off Thyristor (ETO) – Integrated Gate-Commutated Thyristor (IGCTs) – MOS-Controlled Thyristors(MCTs) – Static Induction Thyristors (SITHs) – Power integrated circuits (PICs) – symbol, structure and equivalent circuit – comparison of their features.

UNIT - II:
Two-Level Voltage Source Inverter:
Introduction, Sinusoidal PWM, Modulation Scheme, Harmonic Content, Over modulation, Third Harmonic Injection PWM, Space Vector Modulation, Switching States, Space Vectors, Dwell Time Calculation, Modulation Index, Switching Sequence, Spectrum Analysis, Even-Order Harmonic Elimination, Discontinuous Space Vector Modulation.

UNIT - III:
Multilevel Inverters:
Need for Multilevel Inverters, Multilevel Concept, Classification of Multilevel Inverters – Diode Clamped Multilevel Inverter- Principle of Operation – Main Features - Flying Capacitor Multilevel Inverter – Principle of Operation – Main Features, Cascaded Multilevel Inverter, Principle of Operation- Features, Applications of Multilevel Inverters.

UNIT - IV:
DC-DC Switch-Mode Converters And Switching Dc Power Supplies:
Linear Power Supplies, Overview of Switching Power Supplies, Dc-Dc Converters with Electrical Isolation, Control of Switch Mode Dc Power Supplies, Power Supply Protection, and Electrical Isolation in the Feedback loop, designing to meet the Power Supply Specifications. Control Of Dc-Dc Converter, Fly Back, Forward, Full-Bridge Dc-Dc Converter.

UNIT - V:
Resonant Converters:
Introduction to Resonant Converters, Classification of Resonant Converters, Basic Resonant circuit concepts, Series Resonant Circuit-Parallel Resonance Circuit, Resonant Switch Converters: ZCS Resonant Buck Converter, ZVS Resonant Boost Converter.

Text Books:

1. **Power electronics circuits, Devices and applications** by M.H. Rashid PHI –I edition –1995.
2. **Power Electronics converters, Applications and Design** by Ned Mohan, Tore M. Undeland and William P. Robbins, A John Wiley Sons, Inc., Publication 3rdEdition.

Reference Books:

1. **High-Power Converters and AC Drives** by Bin Wu, A John Wiley & Sons, Inc., Publication
2. **Switch mode Power Supply Handbook 3/e, Keith Billings**, Taylor Morey, Mc GrawHill.
3. **Fundamentals of Power Electronics** by Robert W. Erickson , Dragan Maksimovic, Kluwer Academic Publishers 2nd Edition.

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Electrical Machine Design

UNIT - I:
Principles Of Electrical Machine Design:
Introduction, considerations for the design of electrical machines, limitations. Different types of materials and insulators used in electrical machines.

UNIT - II:
Design Of Dc Machines:
Output equation, choice of specific loadings and choice of number of poles, design of Main dimensions of the DC machines, Design of armature slot dimensions, commutators and brushes, magnetic circuit - estimation of ampere turns, design of yoke and pole, field windings – shunt, series and inter poles.

UNIT - III:
Design Of Transformers:
(Single phase and three phase)**:** Output equation for single phase and three phase transformer, choice of specific loadings, expression for volts/turn, determination of main dimensions of the core, types of windings and estimation of number of turns and cross sectional area of Primary and secondary coils, estimation of no load current, expression for leakage reactance and voltage regulation. Design of tank and cooling tubes (round and rectangular).

UNIT - IV:
Design Of Induction Motors:
Output equation, Choice of specific loadings, main dimensions of three phase induction motor, Stator winding design, choice of length of the air gap, estimation of number of slots for the squirrel cage rotor, design of Rotor bars and end ring, design of Slip ring induction motor, estimation of No load current, leakage reactance, and circle diagram.

UNIT - V:
Design Of Synchronous Machines:
Output equation, Choice of specific loadings, short circuit ratio, design of main dimensions, armature slots and windings, slot details for the stator of salient and non salient pole synchronous machines. Design of rotor of salient pole synchronous machines, magnetic circuits, dimensions of the pole body, design of the field winding, and design of rotor of non-salient pole machine.

Text Books:

1. **A Course in Electrical Machine Design**- A.K.Sawhney, Dhanpat Rai & Sons.
2. **Design of Electrical Machines** - V.N.Mittle -4/edition, Standard Publishers Distributors.

Reference Books:

1. **Performance and Design of AC Machines**- M.G.Say, CBS Publishers & Distributors.
2. **Principles of Electrical Machine Design**- R.K.Aggarwal, CBS Publishers.

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Advanced Control Systems

UNIT - I:
State Space Analysis:
State Space Representation, Solution of State Equation, State Transition Matrix, Canonical Forms – Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form.

UNIT - II:

Controllability and Observability:
Tests for controllability and observability for continuous time systems – Time varying case, minimum energy control, time invariant case, Principle of Duality, Controllability and observability form Jordan canonical form and other canonical forms.

UNIT - III:

Describing Function Analysis:
Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.
Phase-Plane Analysis:
Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems

UNIT - IV:
Stability Analysis:
Stability in the sense of Lyapunov., Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.

Calculus Of Variations:
Minimization of functionals of single function, Constrained minimization. Minimum principle. Control variable inequality constraints. Control and state variable inequality constraints. Euler Lagrangine Equation.

UNIT - V:

Modal Control:
Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement. Full order observer and reduced order observer.
Optimal Control: Formulation of optimal control problem. Minimum time, Minimum energy, minimum fuel problems. State regulator problem. Output regulator problem. Tracking problem, Continuous-Time Linear Regulators.

Text Books:

1. **Modern Control System Theory** – by M. Gopal, New Age International Publishers, 2nd edition, 1996
2. **Modern Control Engineering** – by K. Ogata, Prentice Hall of India, 3rd edition, 1998

Reference Books:

1. **Control Systems Engineering** by I.J. Nagarath and M.Gopal, New Age International (P) Ltd.
2. **Digital Control and State Variable Methods** – by M.Gopal, Tata McGraw-Hill Companies, 1997.
3. **Systems and Control** by Stainslaw H. Zak, Oxford Press, 2003.

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Electrical Distribution Systems

UNIT - I:
General Concepts:
Introduction to distribution systems, Load modeling and characteristics. Load factor, Coincidence factor, Contribution factor and Loss factor - Relationship between the Load factor and loss factor. Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics.

Distribution Feeders:
Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, Factors affecting the feeder voltage level, Feeder loading, Application of general circuit constants to radial feeders, basic design practice of the secondary distribution system, secondary banking, secondary network types, secondary mains.

UNIT - II:
Substations:
Location of Substations: Rating of distribution substation, service area with 'n' primary feeders, Benefits derived through optimal location of substations, optimal location of substations.
Distribution System Analysis:
Voltage drop and Power-loss calculations: Derivation for voltage drop and Power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines,Analysis of non-three phase systems.

UNIT - III:
Protection:
Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, Line Sectionalizes, and Circuit Breakers,
Coordination:
Coordination of Protective Devices: Objectives of protection cocordination, General coordination procedure.

UNIT - IV:
Compensation for power factor improvement
Capacitive compensation for power-factor control. Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), Power factor correction, capacitor allocation - Economic justification - Procedure to determine the best capacitor location.

UNIT - V:
Voltage Control:
Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation, voltage fluctuations.

Text Books:
1. **Electric Power Distribution system, Engineering** by Turan Gonen, TMH.
2. **Electric Power Distribution** by A.S. Pabla, Tata Mc Graw-hill Publishing Company, 1997, 6th edition.

Reference Books:
1. **Electrical Power Distribution and Automation** by S.Sivanagaraju,V.Sankar,Dhanpat Rai and Co.
2. **Electrical Power Distribution Systems** by V. Kamaraju, TMH Publishers, 2nd Edition.

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Analysis and Design of Switched Mode Converters

UNIT - I:
DC-DC Switched Mode Converters:
Review of Buck Converter, Boost Converter, Buck, Boost, CUK & SEPIC converter, Duty cycle derivation, Different conduction modes (CCM & DCM), Voltage and Current waveforms, Calculation of output voltage ripple, Problems.

UNIT - II:
Switching Dc Power Supplies:
Linear power supplies, Overview of switching power supplies, switching losses, Fly back and Forward Converters. Duty cycle derivation, waveforms, comparison of converters, Problems

UNIT - III:
Control Aspects
Voltage feed- forward PWM control, Current mode control, Power Supply Protection, Electrical isolation in the feedback loop, Designing to meet Power Supply Specifications

UNIT - IV:
Converter Design for Buck, Boost, Flyback & Forward Converters only)
Selection of output filter capacitor, Selection of energy storage inductor, Design of High Frequency Inductor and High frequency Transformer, Selection of switches. Snubber circuit design, Pulse width modulator circuit, Design of driver circuits, Necessity of EMI filter

UNIT - V:
Thermal Model:

Thermal Resistance, Selection of Heat sinks, Simple Heat sink calculations
Applications:

DC/DC converter as Power Factor Corrector (active shaping of the line current)
Offline Computer Power Supply System, Uninterruptible AC Power Supplies, Space Craft Power Supply etc

Text Books:

1. **Mohan N. Undeland . T & Robbins W., Power Electronics Converters, Application and Design.** John Wiley, 3rd edition, 2002
2. **Umanand L., Bhat S.R., Design of magnetic components for switched Mode Power Converters.** , Wiley Eastern Ltd.,1992

Reference Books:

1. **Krein P.T .Elements of Power Electronics**., Oxford University Press
2. **M.H.Rashid, Power Electronics**. Prentice-Hall of India
3. **Robert. W. Erickson, D. Maksimovic .Fundamentals of Power Electronics**., Springer International Edition, 2005

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B.Tech. EEE	**L**	**T-P-D**	**C**
IV Year – I Semester	**3**	**0-0-0**	**3**

Special Machines and Control

UNIT - I:

Stepper Motors

Constructional features, principle of operation, modes of excitation, single phase stepping motors, torque production in variable Reluctance (VR) stepping motor, Dynamic characteristics, permanent magnet type Stepper Motor and Hybrid stepper Motors. Open loop control, Closed loop control of stepping motor, microprocessor based controller.

UNIT - II:

Synchronous Reluctance Motors

Constructional features: axial and radial air gap Motors. Operating principle, reluctance torque – Phasor diagram, motor characteristics, linear induction motors.

UNIT - III:

Switched Reluctance Motors

Constructional features, principle of operation. Torque equation, Power controllers, Characteristics and control. Microprocessor based controller. Sensor less control.

UNIT - IV:

Permanent Magnet Brushless Dc Motors

Commutation in DC motors, Difference between mechanical and electronic commutators, Hall sensors, Optical sensors, Multiphase Brushless motor, Square wave permanent magnet brushless motor drives, Torque and emf equation, Torque-speed characteristics, Controllers-Microprocessor based controller. Sensorless control.

UNIT - V:

Permanent Magnet Synchronous Motors

Principle of operation, EMF, power input and torque expressions, Phasor diagram, Power controllers, Torque speed characteristics, Self control, Vector control, Current control schemes. Sensor less control.

Text Books:

1. **Brushless Permanent Magnet and Reluctance Motor Drives** by T.J.E. Miller, Clarendon Press, Oxford, 1989.
2. **Stepping Motors – A Guide to Motor Theory and Practice** by P.P. Aearnley, Peter Perengrinus, London, 1982.

Reference Books:

1. **T. Kenjo, Stepping Motors and Their Microprocessor Controls**, Clarendon Press London, 1984.
2. **Permanent Magnet and Brushless DC Motors** byT. Kenjo and S. Nagamori, Clarendon Press, London, 1988.
3. **Special Electrical Machines** by K.Venkataratnam, University press, 2008.

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Optimization Techniques

UNIT - I:

Introduction And Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

Classical Optimization Techniques:

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints.

Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT - II:

Linear Programming:

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simple method – simplex algorithm.

Transportation Problem:

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

UNIT - III:

Unconstrained Nonlinear Programming:

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method

Unconstrained Optimization Techniques:

Univariate method, Powell's method and steepest descent method.

UNIT - IV:

Constrained Nonlinear Programming

Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

UNIT - V:

Dynamic Programming

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

Text Books:

1. **Engineering optimization: Theory and practice** by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. **Introductory Operations Research** by H.S. Kasene and K.D. Kumar, Springer (India), Pvt .LTd.

Reference Books:

1. **Optimization Methods in Operations Research and systems Analysis** – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. **Operations Research – theory and applications** by Dr. S.D.Sharma, Macmillan publishers India Ltd, 4th edition.
3. **Operations Research: An Introduction**" by H.A. Taha, PHI Pvt. Ltd, 6th edition.

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Electrical Measurement Lab

Any Ten of the experiments are required to be conducted as compulsory experiments :

Experiment 1. Calibration and testing of 1- Φ Energy meter.

Experiment 2. Calibration of dynamometer type Power Factor meter.

Experiment 3. Measurement of Unknown voltage by DC Crompton potentiometer.

Experiment 4. Measurement of Low resistance by using Kelvin's double bridges.

Experiment 5. Measurement of Iron losses by using Lloyd, Fisher magnetic method.

Experiment 6. Measurement of unknown capacitance by using Schering bridge.

Experiment 7. Measurement of Inductance by using Anderson bridge.

Experiment 8. Measurement of 3-Φ reactive power with volt ampere method.

Experiment 9. Measurement of parameters of choke coil using three voltmeter and three Ammeter methods.

Experiment 10. Linear variable differential transformer (LVDT) trainer and capacitance pickup-Characteristics and calibration.

Experiment 11. Measurement of unknown inductance by using Maxwell's bridge.

Experiment 12. Resistance strain guage.

Experiment 13. PT testing by comparison.

Experiment 14. CT testing using mutual inductor.

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Power Systems & Simulation Lab

Any ten experiments are to be performed, selecting five from each category:-

Hard ware based experiments:-

Experiment 1. Differential protection of 1-ϕ transformer.
Experiment 2. Characteristics of over voltage relay.
Experiment 3. Characteristics of over current relay.
Experiment 4. Finding the sequence impedance of 3-ϕ transformer
Experiment 5. Equivalent circuit of a 3 winding Transformer

Simulation based experiments:-

Experiment 6. Sinusoidal Voltages and Currents
Experiment 7. Equivalent circuit of a Transformer
Experiment 8. Determination of voltage and power at the sending end, voltage regulation using medium line model
Experiment 9. Determination of line performance when loaded at receiving end
Experiment 10. Computation of line parameters of transmission lines
Experiment 11. Modeling of short and medium transmission lines.
Experiment 12. Modeling of Long transmission lines.
Experiment 13. Develop a program to simulate Ferranti effect

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SOFT SKILLS LAB - I
(Common to all Branches)

Activity/ Experiment = 12

KNOW YOURSELF/ SELF DISCOVERY and SOFT SKILLS

1. Introduction—Importance of Knowing Yourself

   Process of knowing yourself—SWOT analysis

   Benefits of SWOT analysis---Using SWOT analysis

   SWOT analysis grid—questions to complete the grid

2. Introduction –What are soft skills?—importance of soft skills

   Selling your skills—Attributes regarded as soft skills—Soft Skills

   Social Soft Skills—Thinking Soft Skills—Negotiating –Exhibiting your Soft Skills

3. Identifying your soft skills—Improving your soft skills –Train Yourself

   Top 60 soft skills—Practicing soft skills—Measuring Attitudes

Time and Stress Management

4. Introduction—The 80-20 rule—take a good look at the people around you—Examine your work

   Sense of time management –around you—examine your work—sense of time management

   Time is money—features of time—three secrets of time management

5. Time management matrix—analysis of time matrix—effective scheduling

   Grouping of activities—five steps to successful time management

   Difficulties in time management—evils of not planning—interesting facts about time

   Deal say of spending a day—time wasters—time savers—realizing the value of time

   Time circle planner.

   Introduction –Meaning—Effects , Kinds , and Sources of Stress

   Case study—spotting stress—stress management tips

Activity III Developing Positive Attitude

6. Introduction—meaning –features of attitudes—attitude and human behavior : Passive, Aggressive and Behavior

   Formation of attitudes—change of attitudes—what can you do to change attitude?

Ways of changing attitude in a person—attitude in a workplace

Features of a good team player

7. The power of positive attitude—developing positive attitude

   Obstacles in developing positive attitude—staying negative—examples of negative attitude

   Overcoming negative attitude—negative attitude and its results.

Activity IV Body Language

8. Introduction –body talk—Voluntary and involuntary body language

   Forms of body language—parts of body language—origin of body language

   Uses of body language—Body language in building interpersonal relations

9. Body language in building interpersonal relations—reasons to study body language

   Improving your body language –types of body language—gender differences

   Body language—shaking hands

   Interpreting body language

Activity V Practice in Presentation Skills

10. Types of Presentations

    Do's and Don'ts of Presentation Skills

11. Body language in presentation skills

12. Examples—Aspects, etc

Textbooks:
Soft Skills: Know Yourself and Know the World—Dr. K. Alex-S. Chand Publising-2010

Reference Books:
Managing Soft skills: K.R. Lakshminarayanan & Murugavel, Scitech Publications-2010

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B.Tech. EEE	**L**	**T-P-D**	**C**
IV Year - II Semester	**4**	**0-0-0**	**4**

Management Science For Engineers

UNIT - I:

Introduction to Management: Concepts of Management and Organization—Nature, Importance and Functions of Management, System Approach to Management--Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor. Theory of Motivation -- Leadership Styles, Social responsibilities of Management.

Designing Organisational structures: Basic concepts related to Organization—Departmentation and Decentralization, Types and Evaluation of Mechanistic and organic structures of organization and suitability.

UNIT - II:

Operations Management: Principles and Types of Plant Layout – Methods of production (Job, batch and Mass Production), Work study- Basic procedure involved in Method Study and Work measurement – Business Process Reengineering (BPR)--Statistical Quality control :control charts of variables and attributes (Simple problems) and Acceptance sampling, Deming's contribution to quality. Objectives, Need for inventory control, EOQ, ABC Analysis, purchase procedure, Stores management and stores records- Supply chain management.

Objectives of inventory control, EOQ, ABC Analysis, purchase procedure, Stores management and stores records- JIT system, Supply Chain Management.

Functions of Marketing, Marketing mix, marketing strategies based on product life cycle, channels of distribution

UNIT - III:

Human Resources management(HRM): Concepts of HRM, HRD and Personnel Management and Industrial Relations(PMIR), HRM vs PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and development, Placement, Wage and salary Administration, Promotion, Transfer, Separation, performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating – Capability Maturity Model (CMM) Levels – Performance Management System.

UNIT - IV:

(PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of completing the project within given time, Project Cost analysis, Project cost analysis, project crashing, (simple problems).

UNIT - V:

Strategic Management: Mission Goals, Objectives, Policy, Strategy, Programmes , Elements of Corporate planning process, Environmental Scanning, SWOT analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Bench Marking and Balanced Score Card as Contemporary Business Strategies.

Text Books:

1. **Stoner, Freeman, Gilbert, Management**, 6th Edition, Pearson Education, 2009.
2. **P. Vijaya Kumar , N. Appa Rao and Ashima B. Chhalill,** Cengage Learning India Pvt Ltd., 2012.

Reference Books:

1. **Kotler Philip & Keller,Kevin Lane:** Marketing Management PHI. 2009.
2. **Koontz. Weihrich, & Aryasri:** Principles of Management, TMH, 2009.
3. **Thomas N.Duening & John Mivancevich Management**--Principles and Guidelines. Cengage, 2009.

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Power Quality

UNIT - I:
Introduction:

Introduction of the Power Quality (PQ) problem, Terms used in PQ: Voltage, Sag, Swell, Surges, Harmonics, over voltages, spikes, Voltage fluctuations, Transients, Interruption, overview of power quality phenomenon, Remedies to improve power quality, power quality monitoring

UNIT - II:
Long Interruptions:

Interruptions – Definition – Difference between failures, outage, Interruptions – causes of Long Interruptions – Origin of Interruptions – Limits for the Interruption frequency – Limits for the interruption duration – costs of Interruption – Overview of Reliability evaluation to power quality, comparison of observations and reliability evaluation.

Short Interruptions:

Short interruptions – definition, origin of short interruptions, basic principle, fuse saving, voltage magnitude events due to re-closing, voltage during the interruption, monitoring of short interruptions, difference between medium and low voltage systems. Multiple events, single phase tripping – voltage and current during fault period, voltage and current at post fault period, stochastic prediction of short interruptions

UNIT - III:

Voltage Sag – Characterization – Single Phase:

Voltage sag – definition, causes of voltage sag, voltage sag magnitude, and monitoring, theoretical calculation of voltage sag magnitude, voltage sag calculation in non-radial systems, meshed systems, and voltage sag duration.

Voltage Sag – Characterization – Three Phase:

Three phase faults, phase angle jumps, magnitude and phase angle jumps for three phase unbalanced sags, load influence on voltage sags.

UNIT - IV:
PQ Considerations in Industrial Power Systems:

Voltage sag – equipment behavior of Power electronic loads, induction motors, synchronous motors, computers, consumer electronics, adjustable speed AC drives and its operation. Mitigation of AC Drives, adjustable speed DC drives and its operation, mitigation methods of DC drives.

UNIT - V:
Mitigation of Interruptions and Voltage Sags:

Overview of mitigation methods – from fault to trip, reduces the number of faults, reducing the fault clearing time changing the power system, installing mitigation equipment, improving equipment, immunity, different events and mitigation methods. System equipment interface – voltage source converter, series voltage controller, shunt controller, combined shunt and series controller.

Power quality and emc standards:

Introduction to standardization, IEC Electromagnetic compatibility standards, European voltage characteristics standards, PQ surveys.

Text Books:

1. Understanding Power Quality Problems" by Math H J Bollen. IEEE Press.
2. Bipin Singh, simmi P.Burman

References Books:

1. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso, H.Wayne Beaty, 'Electrical Power Systems Quality' McGraw Hill,2003.(For Chapters1,2,3, 4 and 5)
2.G.T. Heydt, 'Electric Power Quality', 2nd Edition. (West Lafayette, IN, Stars in a Circle Publications, 1994). (For Chapter 1, 2, 3 and 5)

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B.Tech. EEE	**L**	**T-P-D**	**C**
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H V D C Transmission

UNIT - I:

Basic Concepts:

Necessity of HVDC systems, Economics and Terminal equipment of HVDC transmission systems, Types of HVDC Links, Apparatus required for HVDC Systems, Comparison of AC and DC Transmission, Application of DC Transmission System, Planning and Modern trends in D.C. Transmission.

Analysis of HVDC Converters:

Choice of Converter Configuration, Analysis of Graetz circuit, Characteristics of 6 Pulse and 12 Pulse converters, Cases of two 3 phase converters in Y/Y mode – their performance.

UNIT - II:

Converter And HVDC System Control:

Principle of DC Link Control, Converters Control Characteristics, Firing angle control, Current and extinction angle control, Effect of source inductance on the system, Starting and stopping of DC link, Power Control.

Reactive Power Control in HVDC:

Introduction, Reactive Power Requirements in steady state, sources of reactive power- Static VAR Compensators, Reactive power control during transients.

UNIT - III:

Power Flow Analysis In Ac/Dc Systems:

Modeling of DC Links, DC Network, DC Converter, Controller Equations, Solution of DC load flow, P.U. System for DC quantities, solution of AC-DC Power flow- Simultaneous method-Sequential method.

UNIT - IV:

Converter Faults And Protection:

Converter faults, protection against over current and over voltage in converter station, surge arresters, smoothing reactors, DC breakers, Audible noise, space charge field, corona effects on DC lines, Radio interference.

UNIT - V:

Harmonics:

Generation of Harmonics, Characteristics harmonics, calculation of AC Harmonics, Non-Characteristics harmonics, adverse effects of harmonics, Calculation of voltage and Current harmonics, Effect of Pulse number on harmonics

Filters

Types of AC filters, Design of Single tuned filters –Design of High pass filters.

Text Books:

1. **HVDC Power Transmission Systems: Technology and system Interactions** by K.R.Padiyar, New Age International (P) Limited, and Publishers.
2. **HVDC Transmission** by S K Kamakshaiah, V Kamaraju, TMH Publishers.

Reference Books:

1. **EHVAC and HVDC Transmission Engineering and Practice** – S.Rao.
2. **HVDC Transmission by Jos Arrillaga, The institution of electrical engineers,** IEE power & energy series 29, 2nd edition.
3. **Direct Current Transmission** by E.W.Kimbark, John Wiley and Sons.

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B.Tech. EEE	**L**	**T-P-D**	**C**
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Artificial Neural Networks and Fuzzy Logic

UNIT - I:

Introduction To Neural Networks:

Introduction, Humans and Computers, Biological Neuron and organization of the brain, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model and Design of logic gates, Historical Developments, Potential Applications of ANN.

Essentials Of Artificial Neural Networks:

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

UNIT - II:

Single Layer Feed Forward Neural Networks:

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem and concepts, Limitations of the Perceptron Model, Applications.

Multilayer Feed Forward Neural Networks:

Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Learning Difficulties and Improvements

UNIT - III:

Associative Memories:

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function

Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network, Applications.

UNIT - IV:

Classical And Fuzzy Sets:

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Operations, properties, fuzzy relations, membership functions.

Fuzzy Logic System Components:

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT - V:

Applications:

Neural network applications: Process identification, control, fault diagnosis and load forecasting.

Fuzzy logic applications: Fuzzy logic control, Design and Analysis

Text Books:

1. **Neural Networks, Fuzzy logic, Genetic algorithm - synthesis and applications** by Rajasekharan and Rai, PHI Publications.
2. **Artificial neural networks** by B.Yegnarayana, PHI publications.

Reference Books:

1. **Neural Networks** by James A Freeman and Davis Skapura, Pearson Education, 2002.
2. **Neural Networks** by Simon Hakins , Pearson Education
3. **Neural Engineering** by C.Eliasmith and CH.Anderson, PHI

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Power System Dynamics

UNIT-I:
Basic Concepts
Power system stability states of operation and system security - system dynamics - problems system
model analysis of steady State stability and transient stability - simplified representation of Excitation control.

UNIT-II:
Modeling of Synchronous Machine:
Synchronous machine - park's Transformation-analysis of steady state performance per - unit quantities-Equivalent circuits of synchronous machine-determination of parameters of equivalent circuits.

UNIT-III:
Excitation System
Excitation system modeling-excitation systems block Diagram - system representation by state equations- Dynamics of a synchronous generator connected to infinite bus - system model Synchronous machine model-stator equations rotor equations - Synchronous machine model with field circuit - one equivalent damper winding on q axis (model 1.1) - calculation of Initial conditions.

UNIT-IV:
Analysis of Single Machine System
Small signal analysis with block diagram - Representation Characteristic equation and application of
Routh Hurwitz criterion- synchronizing and damping torque analysis-small signal model - State equations.

UNIT-V:
Application of Power System Stabilizers
Basic concepts in applying PSS - Control signals - Structure and tuning of PSS - Washout circuit Dynamic compensator analysis of single machine infinite bus system with and without PSS.

Text Books:
1. **K.R. PADIYAR," Power system dynamics** "- B.S. Publications.
2. **P.M. Anderson and A.A. Fouad, "Power system control and stability**",IEEE Press

References:
1. **R. Ramanujam, "Power Systems Dynamics**"- PHI Publications.

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E H V A C TRANSMISSION

UNIT- I:
E.H.V.A.C. Transmission line trends and preliminary aspect standard transmission voltages – Estimation at line and ground parameters-Bundle conductor systems-Inductance and Capacitance of E.H.V. lines – positive, negative and zero sequence impedance – Line Parameters for Modes of Propagation.

UNIT- II:
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:
Electrostatic induction in unenergized lines – measurement of field and voltage gradients for three phase single and double circuit lines – un energized lines. Power Frequency Voltage control and over-voltages in EHV lines: No load voltage – charging currents at power frequency-voltage control – shunt and series compensation – static VAR compensation.

UNIT - IV:
Corona in E.H.V. lines – Corona loss formulae- attention 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:
Design of EHV lines based on steady state and transient limits - EHV cables and their characteristics.

Text Books:
1. **R. D. Begamudre ,"EHVAC Transmission Engineering",** New Age International (p) Ltd. 3rd Edition.
2. **K.R. Padiyar, "HVDC Power Transmission Systems**" New Age International (p) Ltd. 2nd revised Edition, 2012.

References Books:
1**. S. Rao "EHVAC and HVDC Transmission Engg. Practice**" Khanna publishers.
2**. Arrillaga.J " High Voltage Direct Current Transmission**" 2nd Edition (London) peter Peregrines, IEE, 1998.
3. **Padiyar.K.R, " FACTS Controllers in Power Transmission and Distribution**" New Age Int. Publishers, 2007.

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Reliability Engineering and Applications to Power Systems

UNIT – I
Basics of Probability theory & Distribution
Basic probability theory – rules for combining probabilities of events – Bernoulli's trials – probabilities density and distribution functions – binomial distribution – expected value and standard deviation of binomial distribution.

UNIT - II
Network Modelling, Reliability Analysis & Reliability functions
Analysis of Series, Parallel, Series-Parallel networks – complex networks – decomposition method.

Reliability functions f(t), F(t), R(t), h(t) and their relationships – exponential distribution – Expected value and standard deviation of exponential distribution – Bath tub curve – reliability analysis of series parallel networks using exponential distribution – reliability measures MTTF, MTTR, MTBF.

UNIT - III
Markov Modelling, Frequency & Duration Techniques
Markov chains – concept of stochastic transitional probability Matrix, Evaluation of limiting state Probabilities. – Markov processes one component repairable system – time dependent probability evaluation using Laplace transform approach – evaluation of limiting state probabilities using STPM – two component repairable models.

Frequency and duration concept – Evaluation of frequency of encountering state, mean cycletime, for one , two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering of merged states.

UNIT - IV
Generation System Reliability Analysis
Reliability model of a generation system– recursive relation for unit addition and removal – load modeling - Merging of generation load model – evaluation of transition rates for merged state model – cumulative Probability, cumulative frequency of failure evaluation – LOLP, LOLE.

UNIT - V
Composite Systems Reliability Analysis & Distribution System and Reliability Analysis
Decompositions method – Reliability Indices – Weather Effects on Transmission Lines. Basic Concepts – Evaluation of Basic and performance reliability indices of radial networks.

Text Books:

1. Reliability Evaluation of Engg. System – R. Billinton, R.N.Allan, Plenum Press, New York, reprinted in India by B.S.Publications, 2007.

References Books:

2. Reliability Evaluation of Power systems – R. Billinton, R.N.Allan, Pitman Advance Publishing Program, New York, reprinted in India by B.S.Publications, 2007.

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Soft Skills Lab - II
(Common to all Branches)

Activity/ Experiment = 12

Group Discussion

1. Dynamics of Group discussion—tips for Group Discussion—Traits tested in GD
2. Non-verbal Communication in GD
3. Body language in GD

Interview Skills

4. Introduction—types of Interview
5. FAQ's in Interview
6. Reasons for rejecting a candidate
7. On the day of interview
8. common mistakes in interview
9. Post interview etiquette
10. Dress code and tips for job seekers at interview
11. Body language in Interview skills

Mock Interview

12. Parameters to evaluate students' performance

Text Books:
Soft Skills: Know Yourself and Know the World—Dr. K. Alex-S. Chand Publising-2010

Reference Books:
Managing Soft skills: K.R. Lakshminarayanan & Murugavel, Scitech Publications-2010