VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

An Autonomous Institution

Aziznagar Gate, C.B. Post, Hyderabad - 500 075, Telangana.

ACADEMIC REGULATIONS & SYLLABI (R15)

ELECTRICAL & ELECTRONICS ENGINEERING

for

B.TECH FOUR YEAR DEGREE COURSE

(I- IV year syllabus)

(Applicable for the batches admitted from the Academic Year 2015-2016 onwards)

Head of the Department
Department of Electrical & Electronics Engg
Vidya Jyothi Institute of Technology
HYDERABAD-500 075

PRINCIPAL
Vidya Jyothi Institute of Technology
Himayatnagar (Vill), C.B. Post.,
Hyderabad-75.

Part – A

ACADEMIC REGULATIONS (R-15)

Definitions of Key Words

Academic Year: An academic year is referred as the period consisting of two consecutive semesters with 16 weeks each of instructional period followed by both the semester exams.

Course: A plan of study of a particular subject leading to an examination. All the courses need not carry the same weight. A course may be designed to comprise of lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/ viva/ seminars/ assignments/ presentations etc. or a combination of some of these.

Choice Based Credit System (CBCS): Choice Based Credit System (CBCS) is the programme in which the students have a choice to choose from the prescribed courses and can learn at their own pace and the entire assessment is graded-based on a credit system.

Credit Point: It is the product of Grade Point and Number of Credits for a course.

Credit: A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/ field work per week.

Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student of all the semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It isexpressed up to 2nd decimal place.

Grade Point: It is a numerical weight allotted to each letter Grade on a 10-point scale.

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F.

Programme: An Educational Programme leading to the award of a Degree.

Semester: Each semester will consist of 16-18 weeks of academic work equivalent to 90 actual teaching days.

Semester Grade Point Average (SGPA): It is a measure of performance of the work done by the student in a semester. It is the ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to 2nd decimal place.

Transcript or Grade Card or Certificate: Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

Types of Courses: The Courses in under B.Tech, program may be of three kind's viz., Core, Elective and Mandatory.

a) Core Course:-

There may be a Core Course in every semester, and are to be compulsorily studied by a student and is essential requirement for a given Programme.

b) Elective Course:-

Elective Course is a course which can be chosen by the students from a pool of subjects. In general, the elective course is,

- Supportive to the discipline of study
- Providing an expanded scope of the course subjects
- Nurturing student's proficiency/skill/Research.
- In case an elective is "Discipline centric" and is offered by the student's department itself, the elective is called **Professional elective**.
- On the other hand, if the elective is offered by the other departments or if the choice is given to the students to choose from other disciplines, the elective is called an "**Open Elective**."

c) Mandatory Courses (Non-Credit Courses)

AICTE considers that the Course work of certain subjects is essential and as such for the award of a B.Tech degree a pass in these subjects is made mandatory. Therefore, such types of courses are referred as **mandatory courses**. As the AICTE also feels that only a familiarity with the subject content of these courses is essential, only a pass in each of these courses is required. Therefore, these subjects are included in the curriculum as non-Credit courses.

ACADEMIC REGULATIONS FOR B. TECH. (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2017-18 onwards.

1. Courses of Study:

The following Four year Bachelor of Technology (B.Tech.) Programmes under Choice Based Credit System (CBCS) are offered with effect from the Academic Year 2017-18 onwards:

S. No.	Branch	Branch Code
I	Civil Engineering	01
II	Electrical and Electronics Engineering	02
III	Mechanical Engineering	03
IV	Electronics and Communication Engineering	04
V	Computer Science and Engineering	05
VI	Information Technology	12

2. Admission Procedure

2.1. Admissions will be done as per the norms prescribed by the Government of Telangana State.

2.2. The Government orders with regard to the admissions in vogue shall prevail.

2.3. The candidate should have passed the prescribed qualifying examination on the date of Admission.

3. Award of B. Tech. Degree

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

3.1 The candidate shall register for 192 credits and secure all the 192 credits by securing a minimum CGPA of 5.0.

3.2 The external examination in all the subjects shall be conducted at the end of each semester for all the eight semesters.

3.3 Students joining the B.Tech. Programme shall have to complete the programme within 8 years from the year of joining. Similarly, the students joining the B.Tech. Programme in the third semester directly through Lateral Entry Scheme (LES) shall have to complete the programme within 6 years from the year of joining otherwise they shall forfeit they will not be permitted to pursue their studies nor will be allowed to write the exams.

4. Course Structure:

4.1 The course shall be of four Academic year's duration, each academic year having two semesters. Each semester shall have a minimum **16** weeks of instruction, with a minimum of **90** Instructional Days per Semester.

4.2 **Fast Track Curriculum Scheme:** With a view to encourage the merit students to take up Internships as per the guidelines of AICTE.A student at the end of B. Tech III year I semester and at the end of B. Tech III year II semester either having CGPA of ≥ 7.0 or having passed all the previous courses in one attempt with a minimum SGPA ≥ 5.0 is allowed to register for the additional theory courses. The student can take one extra subject in each semester and can complete the program in 3 ½ years but the original degree will be issued along with his/ her batch mates after completing 4 years of stay in the college. A subject/ Course may be offered to the students, only if a minimum of 30 students opt for

it. The maximum strength of a section is limited to 70.

4.3 **Credits:**

Credits shall be assigned to each Subject/ Courses in an L: T: P: C (Lecture Periods: Tutorial Periods: Practical Periods: Credits) Structure, based on the following general pattern.

Type of course		Clock hour/week			
		L	T	P	C
Theory	1)	04	01	-	04
	2)	03	01	-	03
	3)	02	01	-	02
Practical		0	0	03	02
Drawing	1)	0	04	-	02
	2)	02	02	-	03
	3)	00	06	-	03
Mini project, Comprehensive Viva Voce Seminar, Major project		-	-	-	15

5. Attendance Requirements

5.1 A student is eligible to write the Semester End examinations only if he / she acquire a minimum of 75% of attendance in aggregate of all the subjects/Courses in that Semester.

5.2 Condonation for the shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted on medical grounds with a documentary evidence approved by the Academic Committee.

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

5.4 Students, whose shortage of attendance is not condoned, are not eligible to write semester end examinations of that semester. Such students are detained and their registration for the examination stands cancelled.

5.5 A student detained due to shortage of attendance in a semester may seek re-admission into that semester, as and when offered, within four weeks from the date of the commencement of class work with the academic regulations of the batch into which he/she gets admitted.

5.6 A student will be promoted to the next semester if he/she satisfies the attendance requirement of the present semester.

5.7 For all mandatory, non credit courses offered in a semester, a "Satisfactory Participation Certificate" shall be issued to the student, only after securing 75% attendance in such course. Letter Grade shall be allotted for these courses.

The courses offered in 8 semesters spread over 4 years have been classified into 8 categories under CBCS

S.No.	Subject categories	No. of Credits
1	Humanities and Social Sciences (HS) Subjects, English, Management and the courses dealing with personality development	15
2	Basic Sciences (BS) Subjects including Mathematics, Physics and Chemistry	30
3	Engineering Sciences (ES), Engg. Workshop, Drawing, Fundamentals of computer Science and courses dealing with the basics of Electrical / Electronics/ Mechanical engineering	30
4	Professional Core (PC) Subjects, Courses dealing with the concerned engineering branch	81
5	Professional Elective (PE) Subjects. The students opt electives offered by the department	12
6	Open Elective (OE) Subjects. Courses offered by the other braches representing technically important subjects from emerging areas.	9
7	Project Work, Seminar and/ or Internship in Industry or elsewhere along with mini project.	10+2+3 =15
8	Mandatory Courses (MC)	nil
	Total Number of credits	192

B.Tech Year wise distribution of credits under CBCS

S.No.	Year	Semester	Credits	Total
1	1st Year	I	25	48
		II	23	
2	2nd Year	I	24	48
		II	24	
3	3rd Year	I	24	48

		II	24	
4	4^{th} Year	I	24	**48**
		II	24	
Total No. of Credits				**192**

6. Promotion regulations

6.1 A student shall be promoted from B.Tech., I Year to II Year only if he/she fulfills the academic requirements of securing 50% of total credits (24 credits out of 48 credits, upto I year II Semester), from all the examinations, whether or not the candidate takes the examinations.

6.2 A student shall be promoted from B.Tech., II Year to III Year only if he/she fulfills the academic requirements of securing 50% of total credits (48 out of 96 credits, up to II year II semester, from all the examinations, whether or not the candidate takes the examinations.

6.3 A student shall be promoted from B.Tech., III year to IV year only if he/she fulfills the academic requirements of securing 50% of total credits (72 out of 144 credits) up to III year II semester), from all the examinations, whether or not the candidate takes the examinations.

7. Minimum Academic Requirements

The following minimum academic requirements are to be satisfied in addition to the requirements mentioned in item no.5.

7.1 A student shall be deemed to have satisfied the minimum academic requirements and has earned the credits allotted to each theory/practical/design/drawing subject/project and secured not less than 35% marks in Semester End Examination (SEE), and minimum 40% of marks in the sum total of the internal evaluation and end examination taken together.

7.2 The student has to pass the failed course by appearing the supplementary examination as per the requirement for the award of degree.

7.3 Students, who fail to earn 192 credits as indicated in the course structure within eight academic years from the year of their admission, shall forfeit their seat in B. Tech. course and their admission stands cancelled.

7.4 A student shall register and put up minimum Attendance and earn all 192 Credits for the award of degree.

7.5 When a student is detained due to shortage of attendance in any semester, no Grade allotments or SGPA/CGPA calculations will be done for that entire Semester in which a student got detained.

7.6 When a Student is detained due to lack of Credits in any year, he may be readmitted after fulfillment of the Academic Requirements, with the Academic Regulations of the Batch into which he gets readmitted for

readmitted candidates. If there are any Professional Electives / Open Electives, the same may also be re-registered if offered. However, if those Electives are not offered in later Semesters, then alternate Electives may be chosen from the SAME set of Elective Subjects offered under that category.

7.7 After securing 192 Credits as specified for the successful completion of the entire UGP, an exemption of 6 Credits (two subjects with 3 credits each) may be permitted to drop resulting in 186 Credits for UGP performance evaluation. Accordingly, the performance of student in 186 Credits shall be taken into account for the calculation of 'the final CGPA and shall be indicated in the Grade Card. However, the student's performances in the earlier individual Semesters, with the corresponding SGPA for which already Grade Cards are given, will not be altered. Further, the optional drop out for such 6 Credits shall not be allowed for i) Laboratory courses, ii) Industrial Training/ Mini-Project, iii) Seminar, iv) Major Project v) Open electives.

7.8 A student is eligible to appear in the End Semester Examination in any Subject/ Course, but absent at it or failed (thereby failing to secure P Grade or above), may reappear for that subject/Course at the supplementary exam as and when the examinations are conducted. In such cases, his Continuous Internal Evaluation(CIE) assessed earlier for that subject/Course will be carried over, and added to the marks to be obtained in the supplementary examinations, for evaluating the performance in that subject.

7.9 A student with a final CGPA (at the end of the UGP) < 5.00 will not be eligible for the Award of the Degree.

8 Evaluation - Distribution and weightage of Marks

81 The performance of a student in each semester shall be evaluated Subject- wise (irrespective of Credits assigned) for a maximum of 100 marks for Theory or Seminar or Drawing/Design or Industry Oriented Mini-Project or Minor Course, etc. For Practical's a maximum of 75 Marks shall be evaluated. However the B. Tech. Project work (Major Project) will be evaluated for 200 Marks. These evaluations shall be based on 25% CIE(Continuous Internal Evaluation) and 75% SEE (Semester End Examinations) and a Letter Grade corresponding to the % marks obtained shall be given.

82 For theory subjects the distribution shall be 25 marks for Continuous Internal Evaluation (CIE) and 75 marks for the Semester End- Examination (SEE).

83 For theory subjects, during the semester there shall be 2 midterm examinations. Each midterm examination will be conducted for 20 marks for descriptive and 5 marks for assignment. The midterm examination consists of Part-A (Short Answer Questions) for 6 marks and Part-B (Long Answer Questions) for 14 marks with duration of 90 Minutes. First midterm examination shall be conducted for 2.5 units of syllabus and second midterm Examination shall be conducted for remaining 2.5 units.

The Average marks secured by a student in I and II Midterm examination are considered and shall be taken as the final marks secured by the student towards Continuous Internal Evaluation in the theory subject.

8.4 In case a few students are absent due to health reasons or any other unavoidable circumstances, or if the performance of some of the students is very poor, all such cases will be referred to a standing committee consisting of the Controller of examinations (Chairman), HoD of the concerned dept. and the Academic coordinator. On the recommendation of the committee, a makeup test will be conducted on payment of fee fixed by the examination branch.

8.5 The Semester End 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, which consists of ten questions (numbered from 1 to 10) two from each unit carrying 2/3 marks each. Part-B consists of five questions (numbered from 11 to 15) 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 (i.e., there will be two questions from each unit and the student should answer any one question).

8.6 For practical subjects there shall be a continuous evaluation during the Semester for 25 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 concerned laboratory teacher.

8.7 The Practical End Semester Examination shall be conducted with an external examiner and the laboratory teacher for 50 marks. The external examiner shall be appointed by the Principal from the panel of examiners recommended by Chairman, Board of Studies in respective Branches.

8.8 For the subject having design and/ or drawing, (such as Engineering Graphics, Engineering Drawing, and Machine Drawing), the distribution shall be 25 marks for Internal Evaluation (5 marks for day-to-day work and 20 marks for internal tests) and 50 marks for Semester End Examination. There shall be one internal test in a semester and shall be considered for the award of marks for internal test.

8.10. There shall be an industry-oriented mini-Project, to be taken up during the vacation after III year II Semester examination. However, the mini project and its report shall be evaluated in IV year I Semester at the time of practical exams. The industry oriented mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external examiner, Head of the department, the supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for industry oriented mini project.

8.11. 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.

8.12. . 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 and is evaluated for 100 marks. The Comprehensive Viva-Voce is intended to assess the students understanding of the subjects he studied during the B. Tech. course. There will be no External Examiner for the Comprehensive Viva-Voce.

8.13. . Out of a total of 200 marks for the major project work, 50 marks shall be for Internal Evaluation and 150 marks for the End Semester evaluation. The End Semester evaluation (viva-voce) shall be conducted by committee. The committee consists of an external examiner, Head of the Department, the supervisor of project and a senior faculty member of the department. The topics for industry oriented mini project, seminar and project work shall be different from each other. The evaluation of project work shall be conducted at the end of the IV year II Semester. The internal evaluation shall be on the basis of two seminars given by each student on the topic of his project.

8.14 . The Laboratory marks and the sessional marks awarded by the faculty are subject to scrutiny by the Institution whenever/wherever necessary. In such cases, the sessional and laboratory marks awarded by the teacher will be referred to a College Academic Committee. The Committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved as per the University rules and produced before the Committees of the University as and when asked for.

8.15 Candidates shall be permitted to apply for recounting/revaluation of SEE scripts within the stipulated period with payment of prescribed fee.

9.0. Malpractice Rules

S.No.	Nature of Malpractices /Improper conduct during examinations	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 fromthe 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.

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 practical's 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 Semester end 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 Semester end examinations. The continuation of the course by the candidate is subject to the academic
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.	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 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.	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 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 & 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 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 a student of the college, who is not a candidate for the particular examination or any person not connected with the examination or college indulges in any type of malpractice or improper conduct mentioned in clauses 6 to 8.	Student of the college will be expelled from the examination hall and cancellation of the performance in that subject and all other subjects. If the candidate has already appeared including practical examinations and project work 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 him/her.
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 the 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 head of Institute for further action for a suitable punishment.	

All the cases pertaining to malpractices in examinations will be referred to a committee constituted by the Chief Controller of Examination and the committee will suggest action as per the

guidelines mentioned above.

10. Grading Procedure:

10.1. Marks will be awarded to indicate the performance of each student in each theory subject, or Lab/Practical, or Seminar, or Project, or Mini-Project, Minor Course etc., based on the % marks obtained in CIE+SEE (Continuous Internal Evaluation + Semester End Examination, both taken together) as specified, and a corresponding Letter Grade shall be given.

10.2. As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall befollowed.

Letter Grade	Performance	Grade Points	% of marks Secured (Class Intervals)
O	Outstanding	10	Greater than or equal to 90%
A+	Excellent	9	80% and less than 90%
A	Very Good	8	70% and less than 80%
B+	Good	7	60% and less than 70%
B	Average	6	50% and less than 60%
C	Pass	5	40% and less than 50%
F	Fail	0	Below 40%
Ab	Absent	0	Absent

10.3. A student obtaining F Grade in any subject shall be considered 'Failed' and will be required to reappear as 'Supplementary Candidate' in the end Semester Examination (SEE), as and when offered. In such cases; his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

10.4. A Letter Grade does not imply any specific % of Marks.

10.5. In general, a student shall not be permitted to repeat any Subject/Course (s) only for the sake of 'Grade Improvement' or 'SGPA/CGPA Improvement'. However, he has to repeat all the Subjects/Courses pertaining to that Semester, when he is detained.

10.6. A student earns Grade Point (GP) in each Subject/ Course, on the basis of the Letter Grade obtained by him in that Subject/ Course (excluding Mandatory non-credit Courses). Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with Credits for that particular Subject/ course. Credit Points (CP) = Grade Point (GP) x Credits for a Course.

10.7. The Student passes the Subject/ Course only when he gets GP ≥ 4 (P Grade or above).

11. Registration/Dropping

11.1. Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the academic calendar. It is absolutely necessary for the student to register for courses in time.

11.2. The student has to register for a minimum of 20 credits and may register up to a maximum of 28 credits based on the advice of the Faculty Advisor. On an average, a student is expected to register for 24 credits.

11.3. A student at the end of II year II semester either having CGPA of ≥ 7.0 or having passed all previous courses in the first attempt with a minimum SGPA ≥ 5.0 is allowed to register for an additional course/ credits from the offered open electives.

11.4. A series of open Electives will be offered to the students of III year I & II sems. and IV year I sem., which can be registered by the students as and when the notifications are issued at the end of II year II sem. and III year II sem. Prior permission for registration of open Electives as an additional course is compulsory.

11.5. A student would be allowed to register for an additional course only if he/she satisfies the prerequisites.

11.6. Departments will notify at the time of registration about the minimum number of students to be enrolled for a particular open elective to be offered.

11.7. Any student may be barred from registering for any course for specific reasons like disciplinary reasons or any other activities carried out by a student, which detrimental to the discipline of the college.

11.8. Dropping of Courses: Within four weeks after the commencement of the semester, the student may, in consultation with his / her faculty advisor, drop one or more courses without prejudice to the minimum number of credits. The dropped courses are not recorded in the Grade Card.

11.9. After Dropping, minimum credits registered shall be 20.

12. Earning of Credits

A student shall be considered to have completed a Course successfully and earned the credits if he/she secures an acceptable letter grade in the range 'O' to 'P'. Letter grade 'F' in any Course implies failure of the student in that Course and no credits earned.

13. Passing Standards:

13.1. A student shall be declared successful or 'passed' in a Semester, only when he gets a SGPA ≥ 5.00 (at the end of that particular Semester); and a student shall be declared successful or 'passed' in the entire UGP, only when he/she gets a CGPA ≥ 5.00; subject to the condition that he secures a GP ≥ 4 (P Grade or above) in every registered Subject/ Course in each Semester (during the entire UGP) for the Degree Award, as required.

13.2. (i) In spite of securing P Grade or above in some (or all) Subjects/ Courses in any Semester, if a Student receives a SGPA < 5.00 and/ or CGPA < 5.00 at the end of such a Semester, then he 'may be allowed' (on the 'specific recommendations' of the Head of the Department and subsequent approval from the Principal) to be promoted to the next year in the course.

(ii) If a student gets **P** grade or an SGPA is less than 5, is eligible to re appear for one or more of the same Subject(s)/ course(s) in which he has secured P Grade(s) in that Semester, at the Supplementary Examinations to be held in the next subsequent Semester(s). In such cases, his Internal Marks (CIE Marks) in those Subject(s) will remain same as those obtained earlier. In these considerations, the newly secured Letter Grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.

13.3. A Student shall be declared successful or 'passed' in any Non-Credit Subject/ Course, if he secures a 40% marks or **P** grade in the end sem exam conducted by the college along with the other examinations.

13.4. After the completion of each Semester, a Grade Card or Grade Sheet (or Transcript) shall be issued to all the registered students of that semester, indicating the Letter Grades and Credits earned. It will show the details of the courses registered (Course Code, Title, No. of Credits, Grade Earned etc.), Credits earned, SGPA, and CGPA.

14. Eligibility for the award of B.Tech. Degree

A student shall be eligible for award of the B.Tech degree if he/she fulfils all the following Conditions:

14.1. The students should successfully complete all the components prescribed in the Programme of study to which he/ she is admitted.

14.2. The student should also obtain CGPA greater than or equal to 5.0.

14.3. Not having any pending disciplinary action.

15. Evaluating of Grade Point Averages:

15.1. SGPA and CGPA the *credit index* can be used further for calculating the Semester Grade Point Average *(SGPA)* and the Cumulative Grade Point Average *(CGPA),* both of which being important performance indices of the student. While *SGPA* is equal to the *credit index* for a semester divided by the total number of *credits* registered by the student in that semester, *CGPA* gives the sum total of *credit indices* of all the previous semesters divided by the total number of *credits* registered in all these semesters. Thus, The Grade Point Average (GPA) will be calculated according to the formula:

$$GPA = \frac{\sum CiGi}{\sum Ci}$$

where Ci = number of credits for the course i, Gi = grade points obtained by the student in the course.

15.2. Semester Grade Point Average (SGPA) is awarded to candidates considering all the courses of the semester. Zero grade points are also included in this computation. SGPA is rounded off to TWO Decimal Places.

SGPA will be computed as follows;

∑ [(Course *credits*) X (*Grade points*)] (for all Courses passed in that semester)

∑ [(Course *credits*)] (for all courses registered in that semester)

15.3. To arrive at Cumulative Grade Point Average (CGPA), the formula is used considering the student's performance in all the courses taken in all the semesters completed up to the particular point of time. CGPA is rounded off to TWO Decimal Places.

CGPA will be computed as follows:

∑ [(Course *credits*) X (*Grade points*)] (for all Courses passed up to that semester)

∑ [(Course *credits*)] (for all Courses registered until that semester)

CGPA is thus computed from the I Year First Semester onwards, at the

end of each Semester, as per the above formula. However, the SGPA of I year I Semester itself may be taken as the CGPA, as there are no cumulative effects.

15.4. Illustrative Example:

An illustrative example given in below Table below indicates the use of the above two equations in calculating SGPA and CGPA, both of which facilitate the declaration of academic performance of a student, at the end of a semester and at the end of successive semesters respectively . Both of them shall be normally calculated up to the second decimal position, so that the *CGPA,* in particular, can be made use of in rank ordering the student's performance in a class. If two students get the same *CGPA*, the tie should be resolved by considering the number of times a student has obtained higher *SGPA;* But, if it is not resolved even at this stage, the number of times a student has obtained higher grades like O, A, B etc shall be taken into account in rank ordering of the students in a class.

Year and Semester	Course No.	Credits	Grade	Grade Points	Credit Points
I Year I sem	XX101	5	A	8	40
I Year I sem	XX102	4	F	0	00
I Year I sem	XX103	3	A+	9	27
I Year I sem	XX104	4	F	0	00
I Year I sem	XX105	5	C	5	25
I Year I sem	XX106	5	P	4	20
Total		**26(18*)**			**112**
SGPA = 112/26 = 4.31				**CGPA = 4.31**	
I Year II Sem	XX107	5	B+	7	35
I Year II Sem	XX108	4	A	8	32
I Year II Sem	XX109	3	C	5	15
I Year II Sem	XX110	5	P	4	20
I Year II Sem	XX111	4	A+	9	36
I Year II Sem	XX112	2	F	0	00
I Year II Sem	Xx113	2	A	8	16
Total		**25(23*)**			**154**
SGPA = 154/25 = 6.16			**CGPA = 266/51 = 5.22**		

*Total No. of credits excluding those with 'F'; this is particularly important to keep track of the number of credits earned by a student up to any semester.

16. Award of Class

16.1. 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:

CGPA	Class Awarded	
≥8.00	First Class with Distinction	From the CGPA secured from 192 credits
≥6.50 - <8.00	First Class	
≥5.50 - <6.50	Second Class	
≥5.00 - <5.50	Pass Class	

16.2. The marks obtained in Internal Evaluation (IE) and Semester End Examination (SEE) will be shown in the memorandum of marks.

16.3. For the purpose of awarding first Class with Distinction (CGPA ≥ 8.0), the student must obtain the minimum required CGPA within 4 academic years or within 3 academic years in case of Lateral Entry candidates by clearing all thecourses.

16.4. Candidates detained/ prevented from writing the semester end examinations due to any reason in any semester are not eligible for the award of First Class with Distinction. Such candidate's even if the CGPA ≥ 8.0 shall be placed in first class.

16.5. For the purpose of awarding First, Second and Pass Class, CGPA obtained in the examinations appeared within the maximum period allowed for the completion of course shall be considered as per the regulations.

16.6. A student with final CGPA (at the end of the UGP) < 5.00 will not be eligible for the award of the Degree.

16.7. The CGPA can be converted to equivalent percentage of marks by using the equation., % of Marks = (CGPA - 0.5) X 10.

17. Consolidated Grade Card

A consolidated grade card containing credits & grades obtained by the candidates will be issued after completion of the four years B. Tech Programme.

18. Withholding of Results

If a student is having any indiscipline related issues pending, the result of the student will be withheld and will not be allowed to move into the next semester. His/ her degree will be withheld in such cases and the matter will be referred to the academic council for final decision.

19. Transitory Regulations

19.1. Discontinued, detained for attendance, detained for want of credits, or failed students are eligible for readmission as and when the course is offered during the subsequent academic year as per the college admission procedures.

19.2. Students on transfer from a non- autonomous or from an autonomous college shall complete all the courses of the concerned programme not covered in the earlier organization. However, he/she should take the remaining courses in the programme along with the other students.

19.3. There shall be no branch transfers after the cutoff date of admissions made in the B.Tech. I year.

20. Transcripts

After successful completion of the total programme of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee.

21. Supplementary Examinations

In addition to the Regular end semester examinations, Supplementary Examinations for the previous semesters will be conducted along with end sem. Examinations. A student can appear for any number of supplementary examinations till he/she clears all courses which he/she could not clear in the first attempt. However the maximum stipulated period cannot be relaxed under any circumstances.

22. Graduation Ceremony

23.1. The College shall have its own annual Graduation Ceremony for the award of degree to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute.

23.2. The College shall institute Prizes and Awards to meritorious students, for being given away annually at the Graduation Ceremony.

24. Termination from the Program

The admission of a student to the program may be terminated and the student may be asked to leave the Institute in the following circumstances:

24.1. The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

24.2. The student fails to satisfy the norms of discipline specified by the

institute from time to time.

25. Non-Credit Courses (Mandatory Courses)

25.1. Requirement of 75% attendance as per the college regulations is compulsory of completing the mandatory courses.

25.2. Specified number of Mandatory Courses among the designated ones is compulsory requirement for all the students for the award of B.Tech. Degree.

25.3. Although these courses do not carry any credits, performance in these subjects is evaluated following the procedure adopted for other subjects with the same marks. However, their performance will be indicated in the student's memo of marks as Satisfactory/ Unsatisfactory.

25.4. Although mandatory courses are Non-Credit Course, all the students should secure a minimum of 40% marks in the end sem. exam conducted by the college along with the other examinations for the award of B.Tech., degree.

26. Amendments

The Academic regulations here under 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 undergoing the program) as may be decided by the Academic Council.

27. General

27.1. Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

27.2. The academic regulation should be read as a whole for the purpose of an interpretation.

27.3. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

27.4. The college may change the academic regulations, course structure & syllabi at any time.

ACADEMIC REGULATIONS FOR B. TECH. (LATERAL ENTRY STUDENTS)

Applicable for the students admitted into II year B. Tech. (Lateral Entry Scheme) from the Academic Year 2017-18 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 The candidate shall register for 144 credits and secure 144 credits by securing a minimum CGPA of 5.0 from the exams. of B.Tech. II to IV year for the award of B.Tech. Degree.

1.3 The students, who fail to fulfill the requirement for the award of the degree in six Academic years from the year of admission, shall forfeit their seats. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

2. **Promotion Rule**

2.1. A student shall be promoted from B.Tech., II Year to III Year if he/she gets at least a minimum of 24 out of 48 credits, up to II year II semester, from all the examinations, whether or not the candidate takes the examinations.

2.2. A student shall be promoted from III year to IV year if he/she gets a minimum of 48 out of 96 credits, up to III year II semester, from all the examinations, whether or not the candidate takes the examinations.

2.3. A student shall register and put up minimum attendance in all 144 credits and earn all 144 credits to be eligible for the award of B.Tech degree.

2.4. A student, who fails to earn 144 credits as indicated in the course structurewithin six academic years, shall forfeit his/her admission in B.Tech. Course.

3. **Award of Class**

A student, who satisfies all the requirements prescribed for the completion of the B.Tech. program, is eligible for the award of the said degree, in any one of the following four classes:

CGPA	Class Awarded	
≥8.00	First Class with Distinction	From the CGPA secured from 144 credits
≥6.50 - <8.00	First Class	
≥5.50 - <6.50	Second Class	
≥5.00 - <5.50	Pass Class	

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

5. The malpractice rules and procedures for evaluating the SGPA and CGPAmentioned under points 9 - 27, are also applicable to the later entry students.

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

An Autonomous Institution

Aziznagar Gate, C.B. Post, Hyderabad - 500 075, Telangana.

Syllabus (R15)

for

B.Tech Four Year Degree Programme (EEE)

(Applicable for the batches admitted from the Academic Year 2015-2016 onwards)

Head of the Department
Department of Electrical & Electronics Engg
Vidya Jyothi Institute of Technology
HYDERABAD-500 075.

ELECTRICAL AND ELECTRONICS ENGINEERING R15

I YEAR I SEMESTER

COURSE STRUCTURE

Subject Code	Subject Name	L	T	P/D	Total Credits	Total Hours	Total Marks
A11001	English-I	2	0	0	2	2	100
A11002	Mathematics - I	4	1	0	3	4	100
A11003	Engineering Physics-I	3	1	0	3	4	100
A11502	C Programming – I	3	1	0	3	4	100
A11004	Engineering Chemistry	3	1	0	3	4	100
A11303 /A11201	Engineering Graphics / Electrical circuits	2	0	3	3	5	100
A11081	English Language Communication Skills Lab-I	0	0	3	2	3	75
A11582	C Programming Lab – I	0	0	3	2	3	75
A11083	Engineering Physics and Chemistry Lab	0	0	3	2	3	75
A11084	IT & Engineering Workshop	0	0	3	2	3	75
	Total	**17**	**7**	**15**	**25**	**35**	**900**

I YEAR II SEMESTER

COURSE STRUCTURE

Subject Code	Subject Name	L	T	P/D	Total Credits	Total Hours	Total Marks
A12005	English-II	2	0	0	2	2	100
A12202/ A12306	Electrical Circuits Theory / Engineering Graphics	3	1	0	3	4	100
A12007	Engineering Physics-II	3	1	0	3	4	100
A12503	C Programming – II	3	1	0	3	4	100
A12006	Mathematics – II	4	1	0	3	4	100
A12009	Mathematics – III	3	1	0	3	4	100
A12085	English Language Communication Skills Lab-II	0	0	3	2	3	75
A12584	C Programming Lab –II	0	0	3	2	3	75
A12088	Engineering Physics Lab	0	0	3	2	3	75
	Total	**18**	**5**	**9**	**23**	**31**	**825**

Note: All End Examinations (Theory and Practical) are of three hours duration.

L – Lecture **T – Tutorial** **P – Practical** **D – Drawing**

L	T/P/D	C
2	0 0	2

ENGLISH-I

(COMMON TO ALL BRANCHES)

MAIN OBJECTIVES:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.

B Tech I Year I Semester

Unit-I: 'Wit and Humor' from 'Skills Annexe' -Functional English for Success

Objectives:

- To enable students to develop their listening skills to improve their pronunciation

L-Listening For Sounds, Stress and Intonation

- To make students aware of the role of speaking in English and its contribution to their success.

S-Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations).

- To develop an awareness in the students about the significance of silent reading for subject and theme.

R- Reading for Subject/ Theme

- To equip the students with the components of different forms of writing

W- Writing Paragraphs

Unit –II: 'Mokshagundam Visvesvaraya' from "Epitome of Wisdom

Objectives:

- To enable the students to use phrasal verbs, expressions, idioms, collocations, pre-fixes and suffixes, and linking words.

G-Types of Nouns and Pronouns

V-Homonyms, homophones synonyms, antonyms

Unit-III: 'Cyber Age' from "Skills Annexe -Functional English for Success

Objectives:

- To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

L – Listening for themes and facts

- To enable students to express themselves fluently and appropriately in social and professional contexts

S -Apologizing, Interrupting, requesting and making polite conversation

- To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

R - For theme and gist

- To equip them with the components of different forms of writing.

W - Describing People, Places, Objectives, Events,

Unit-IV: 'Three Days to See' from "Epitome of Wisdom

Objective:

- To enable the Students to use a wide range of grammatical structures appropriately and accurately in written and spoken English including vocabulary

G- Verb &Verb forms

V- Adjective and Adverb

Unit-V: Human Values & Professional Ethics from "Skills Annexe

Objective:

- To equip the students with the components of different forms of writing..

W- Note-Making, Note-Taking

TEXTBOOKS PRESCRIBED:

For Detailed study:

First Textbook: *"Skills Annexe -Functional English for Success"*,

Published by Orient Black Swan, Hyderabad

For Non-detailed study:

Second text book *"Epitome of Wisdom"*, Published by Maruthi Publications, Guntur.

MATHEMATICS-I

L	T/P/D	C
4	1/-/-	3

(COMMON TO CE, EEE, ME, ECE, CSE & IT)

UNIT-I: Matrices and System of Linear Equations

Matrices and Systems of Linear Equations: Real matrices Symmetric, Skew symmetric, Orthogonal, Complex matrices: Hermitian, Skew Hermitian and Unitary Elementary transformations-Rank-Echelon form, Normal form System of Linear equations Direct Methods (Gauss Elimination, Gauss Jordan).

UNIT-II: Eigen Values and Eigen Vectors

Eigen values, Eigen vectors properties, Clayey-Hamilton Theorem (without Proof) - Inverse and powers of a matrix by Clayey-Hamilton theorem Diagonolization of matrix. Linear Transformation Orthogonal Transformation, Quadratic forms-Nature, Index and Signature.

UNIT-III: Functions of Single Variable and Functions of several variables

Rolle's Theorem Lagrange's Mean Value Theorem Cauchy's mean value Theorem Generalized Mean Value theorem (all theorems without proof) Geometrical interpretation of Mean value theorems. Functions of several variables Partial Differentiation and total differentiation (left as an exercise to student) Functional dependence-Jacobian Determinant- Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT-IV: Improper Integration and Multiple Integrals:

Gamma and Beta Functions-Relation between them, their properties evaluation of improper integrals using Gamma / Beta functions. Multiple integrals - double and triple integrals – change of order of integration- change of variables

UNIT-V: Laplace transform and its applications 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 – Dirac's delta function – Convolution theorem – Periodic function - Differentiation and integration of transforms – Application of Laplace transforms to ordinary differential equations.

TEXT BOOKS:

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Engineering Mathematics Vol - I, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
3. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
4. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley.

REFERENCE BOOKS:

1. Srimanta Pal, Subodh C. Bhunia, (2015) ,Engineering Mathematics, 1st Edition, New Delhi, Oxford University Press
2. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House
3. Ramana B.V (2010), Engineering Mathematics, New Delhi, Tata McGraw Hill Publishing Co. Limited
4. Mathematical Methods: S.R.K. Iyengar and R.K. Jain, Narosa Publishing House.

OBJECTIVES:

1. This course helps in translating a physical or other problem in mathematical model.
2. The course intends to provide an overview of Matrices which occur in physical and engineering problems.
3. To provide an overview of discovering the experimental aspect of modern applied mathematics.
4. This course creates the ability to model, solve and interpret any physical or engineering problem.
5. To gain knowledge about Laplace Transforms, Double integrals and Triple integrals to apply in engineering and technologies.

L	T	C
3	1	3

ENGINEERING PHYSICS – I
(COMMON TO ALL BRANCHES)

OBJECTIVES:

1. To know about crystals, their structures, properties and applications.
2. Able to understand light and LASER phenomena and their applications.
3. To know the fundamentals of Statistical Mechanics and understand about Dielectric and Magnetic materials.

OUTCOMES:

1. Students analyze and apply the studies for scientific applications of crystal in various fields.
2. Ability to interpret the applications of Dielectric and Magnetic materials in technology and daily life.
3. Able to experiment on nature of light and applications of LASER in various fields.

UNIT- I

Crystal Structures

Inter atomic force Cohesive energy of diatomic molecule (Qualitative), Space lattice, unit cell and Lattice parameters, Crystal systems Bravais lattices. Structures, Atomic radius, co-ordination number and packing fractions of Simple Cubic, Body Centered Cubic, Face Centered Cubic lattices, Structure of Diamond.

Crystal directions, planes and X- Ray diffraction

Crystal planes and directions – Miller Indices, Inter planar spacing of orthogonal crystal systems, X-ray Diffraction: Bragg's law, Determination of lattice constant by XRD (Powder method), Crystal defects: Point and Line defects (Qualitative) Burger's Vector.

UNIT- II

Interference, Diffraction and Polarization

Superposition principle, Interference, Coherence, Interference in thin films, Newton's Rings –Experiment, determination of wavelength of monochromatic source. Diffraction Fraunhofer and Fresnel diffraction, Diffraction due to single slit, Diffraction grating (Qualitative). Polarization- Double refraction, Nicol's Prism, applications of Polarization.

UNIT – III

Elements of statistical mechanics

Introduction, Phase space, Definition of Ensembles, Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (Qualitative), Planck's law of black body radiation Deduction of Wien's law and Rayleigh-Jeans law from Planck's law.

Lasers

Characteristics of Lasers, Spontaneous and Stimulated Emission of radiation, meta stable state, Population inversion, lasing action, Einstein's coefficients and relation between them, Ruby Laser, Helium-Neon Laser, applications of Lasers.

UNIT – IV

Magnetism and Magnetic materials

Introduction – Basic definitions, Origin of magnetic moment, Bohr magneton, Dia, Para, Ferro, Antiferro and Ferri magnetism, Domain theory of ferromagnetism, Hysteresis curve – Soft and Hard magnetic materials and their applications.

UNIT- V

Dielectric Properties

Electric Dipole, Dipole Moment, Dielectric Constant, Polarizability, Electric Susceptibility, Displacement Vector, Electronic, Ionic and Orientation Polarizations and Calculation of Ionic and Electronic Polari abilities, Internal Fields in Solids, Clausius Mossotti Equation. Piezo, Pyro and Ferro electricity, applications of ferroelectric materials.

TEXT BOOKS:

(1) Engineering Physics by P K Palanisamy: Scietech publication.
(2) Solid State Physics by M Armugam; Anuradha Publications.

REFERENCE BOOKS:

(1) Introduction to Solid State Physics by Charles Kittel: John Wiley & Sons.
(2) Engineering Physics by R.K. Gaur and S.L. Gupta; Dhanpat Rai and Sons.
(3) Engineering Physics by V Rajendran; McGraw hill education private ltd.
(4) A Text book of Engineering Physics by M N Avadhanulu, P G Kshirsagar: S Chand.
(5) Engineering Physics by K Malik, A K Singh: Tata McGraw hill book publishers.
(6) Engineering Physics by M.R. Srinivasan, New Age Publishers.

L	T/P/D	C
3	1/-/-	3

C PROGRAMMING –I
(ECE, EEE)

OBJECTIVES:

- To understand the various steps in program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs.
- To learn to write Programs in C to solve programs using structured programming approach.
- To introduce the students the basic concepts as input output statements, loops, functions, arrays.

OUTCOMES:

- Students will demonstrate a depth of knowledge and apply the methods of C Language to solve the mathematical problems.
- Ability to apply and develop logical skills and problem solving using C Programming Language.

UNIT-I

Introduction to Computers: Computer System, Computing Environments, Generations of Computer Languages, Software Development Life Cycle, Algorithms and Flowchart.
Data Representation: Decimal, Binary, Octal, Hexadecimal number systems and Inter-Conversions, ASCII values.

UNIT-II

Introduction to C language: Background, Structure of C program, Creating and Running a C-Program, Input/ Output statements, C tokens, Data types, Operators, Operator Precedence and Associatively, Expression evaluation, Type Casting and Type Conversion, C Programming examples.

UNIT-III

Control Structures: Selection Statements: if and switch statements, Iterative Statements/Loops: while, for, do-while statements, goto, break and continue statements, C Programming examples.

UNIT-IV

Arrays: Introduction to one dimensional and two dimensional Arrays- Declaration, Initialization and Accessing array elements, Array applications, C programming examples.
Strings: Introduction, String Input/output functions, Declaration, Initialization and Accessing Strings, Array of Strings, String Manipulation functions- strlen(), strcat(), strcmp(), strcpy(), strrev(), C programming examples.

UNIT- V

Functions: Introduction to functions, Types of functions, Categories of functions, Recursion, Scope and Extent, Storage classes- auto, register, static, extern, Parameter passing techniques, Preprocessor Directives, C programming examples.

TEXT BOOKS

1. Computer Programming & Data Structures, E.Balagurusamy, 4th edition, TMH.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F.Gilberg, Third Edition, Cengage Learnimng.

REFERENCE BOOKS

1. Let Us C, Yashavant P. Kanetkar, BPB Publications.
2. Computer System & Architecture, M. Marris Mano , 3 rd Edition , Pearson Education.
3. Programming in C Reema Thareja, 2 nd Edition Oxford University Press 2015.

L	T/P/D	C
3	1/-/-	3

ENGINEERING CHEMISTRY

Course objectives:
To appraise the students about the importance and role of chemistry in the field of Engineering by explaining the relevant topics. To enable students to apply the knowledge acquired in improving the properties of engineering materials. To provide the students with the necessary knowledge to solve the problems and make decisions with regards to the application of materials in a variety of engineering disciplines. To equip the students with the required fundamentals of engineering chemistry carry out in the interdisciplinary research such that the finding benefit the common man. After the completion of the course, the student would understand about the important chemistry of water, corrosion and its control, polymer chemistry, electro chemistry (including batteries) and advanced engineering materials.

UNIT I: WATER: Hardness of water, expression of hardness ($CaCO_3$ equivalent), units and types of hardness. Estimation of temporary and permanent hardness of water by EDTA method. Numerical problems based on hardness of water. Potable water: characteristics, treatment of water for domestic supply. Desalination of brackish water: reverse osmosis. Alkalinity of water and its determination. Boiler troubles: priming and foaming, boiler corrosion, scales, sludges and caustic embrittlement. Boiler feed water and its treatment: Internal treatment (colloidal, phosphate calgon conditioning of water). External treatment (zeolite process and ion exchange process), Numerical problems on softening of water.

UNIT II: ELECTROCHEMISTRY: Conductance and its types. Electrode, electrode potential, galvanic cell, cell reactions and cell notation, cell EMF, types of electrodes (Normal Hydrogen Electrode , calomel electrode, glass electrode and quinhydrone electrode), Nernst equation Numerical problems. Potentiometric titrations. Concentration cells, classification with examples.
BATTERIES: Introduction to cell and battery, characteristics of a cell. Primary (dry cell and lithium cell) and secondary cells, (lead-Acid cell, Ni-Cd cell and Lithium ion cells,). Solar battery, engineering applications of batteries. Fuel cells Hydrogen Oxygen fuel cell, advantages and engineering applications of fuel cells.

UNIT III: CORROSION AND ITS CONTROL Introduction, types of corrosion : chemical and electrochemical corrosion, mechanism of chemical and electrochemical corrosion, galvanic, water line and pitting corrosion, factors affecting the rate of corrosion: nature of the metal , galvanic series, purity of metal, nature of corrosion product , nature of environment : effect of temperature, effect of pH, humidity. Corrosion control methods: Cathodic protection: sacrificial anode method and impressed current cathode method. Protective coatings: metallic coatings (anodic and cathodic), methods of application on metals, hot dipping (galvanizing), cladding, cementation, electroplating (of copper) electroless plating (of nickel). Organic coatings paints, its constituents and their functions.
UNIT IV: POLYMER CHEMISTRY: Introduction, classification of polymers, types of polymerization (addition and condensation, *mechanisms not included*). Plastics- types of plastics-thermoplastics and thermosetting plastics. Compounding and moulding of plastics. Preparation, properties and engineering applications of PVC, Teflon and Bakelite. Fibers: Nylon 6, 6 and Terelene (Dacron). Elastomers: natural rubber, structure, vulcanization. Synthetic rubbers: Buna-S, butyl rubber, Thikol rubber. Conducting polymers: classification, mechanism of conduction, Poly acetylene preparation and effects of doping on conduction. Applications of conducting polymers.

UNIT V: ADVANCED ENGINEERING MATERIALS: Biodegradable polymers, types, examples: Polyhydroxy butyrate (PHB) ,Poly-Hydroxybutyrate-co-b-Hydroxy valerate (PHBV) ,Polyglycolic acid (PGA) , Polylactic acid (PLA), Poly (Î-caprolactone) (PCL). Applications of biodegradable polymers. Composite materials: Constituents of composite materials. Types of composite materials. Advantages and engineering applications of composite materials. Nano materials: Introduction, basic methods of preparation and applications of nano meterials. Insulators-Classification, characteristics of thermal & electrical insulators and applications. Biofuels biodiesel, general methods of preparation and advantages.

Text Books:

1. Engineering Chemistry by NYS.Murthy, Pearson, India.
2. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpat Rai Publishing Company

Reference Books:

1. Text Book of Engineering Chemistry by Shasi Chawla, Dhantpat Rai publishing Company,
2. Engineering Chemistry by C.Daniel Yesudian , Anuradha publications

L	T/P/D	C
2	-/ 3	3

ENGINEERING GRAPHICS
(C.S.E, IT, E.C.E & E.E.E)

1. Objectives: To know about different types of Drawing Instruments and about different types of lines.
2. To know about different types of curves and projections.
3. To know projections of points, straight lines, solids etc.
4. To analyze the conversion of isometric projection to orthographic projection and vice versa.

Outcomes:

1. Student gets knowledge on various drawing instruments and its usage.
2. Students capable to draw various curves like conic curves, cycloid curves and involutes. Student can understand about orthographic projection and able to draw points, lines, planes and solids according to orthographic projections.
3. Student can convert and draw the given orthographic view to isometric view and vice versa.

UNIT - I

Introduction to Engineering Drawing: Drawing Instruments and their uses, types of lines, use of pencils, Lettering, Rules of dimensioning. Construction of polygons: Inscription and superscription of polygons given the diameter of circle. Curves used in Engineering Practice and their Constructions: Conic Sections: Ellipse, Parabola, Hyperbola including the Rectangular Hyperbola General method only. Cycloidal curves Cycloid, Epicycloid and Hypocycloid Involutes.

UNIT - II

Drawing of Projections or Views (Orthographic Projection in First Angle Projection Only): Principles of Orthographic Projections Conventions First and Third Angle Projections, Projection of Points, Projection of Lines inclined to both planes, True lengths. (Mid points & Traces are eliminated).

UNIT - III

Projections of Planes: Projections of regular Planes – Inclined to both planes. Projections of Solids: Projections of Regular Solids – Regular Polyhedra, solids of revolution, Axis inclined to both planes – Change of position.

UNIT –IV

Isometric Projections/views: Principles of Isometric Projection Isometric Scale Isometric Views Conventions Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines.

UNIT –V

Conversion of Orthographic Views to Isometric Views of simple objects. Transformation of Projections: Conversion of isometric views to orthographic views of simple objects.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhatt / Charotar publishers
2. Engineering Drawing, K.L.Narayana and Kannaiah / Scietech publishers.

REFERENCES:

Engineering Drawing, N.S. Parthasarathy/Vela Murali, Oxford University Press.
Engineering Drawing, Basant Agarwal, TMH

L P C
0 3 2

English Language Communication Skills Lab-I

Objectives

1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency in spoken English and neutralize mother tongue influence
5. To train students to use language appropriately for interviews, group discussion and public speaking.

Learning Outcomes:

1. Better Understanding of nuances of language through audio-visual experience and group activities.
2. Neutralization of accent for intelligibility.
3. Speaking with clarity and confidence thereby enhancing employability skills of the students.

Syllabus: English Language Communication Skills Lab shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

The following course content is prescribed for the English Language Communication Skills Lab:

Exercise-I

CALL Lab: Introduction to Phonetics
Speech Sounds
Vowels and Consonants

Exercise-II

ICS Lab: Ice-Breaking activity and JAM session
Articles, Prepositions, Word formation- Prefixes & Suffixes, Synonyms & Antonyms

Exercise-III

CALL Lab: Structure of Syllables
Past Tense Marker and Plural Marker
Weak Forms and Strong Forms
Consonant Clusters.

Exercise-IV

ICS Lab: Situational Dialogues -Role-Play- Self-introduction and introducing others-Greetings- Apologies- Requests.

Exercise-V

ICS Lab: Social and Professional Etiquette and Telephone Etiquette-Tenses-Non-Verbal Communications.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
2. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
3. **English Pronouncing Dictionary** Daniel Jones Current Edition with CD.
4. **A textbook of English Phonetics for Indian Students** by T. Balasubramanian (Macmillan)
5. **Lab Manual:** A Manual entitled "**English Language Communication Skills (ELCS) Lab Manual- cum- Work Book**", published by Cengage Learning India Pvt. Ltd, New Delhi. 2013.

L	T/P/D	C
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C PROGRAMMING LAB – I
(ECE, EEE)

OBJECTIVES:

- To provide and understanding the concept of programming Languages.
- To write programs in C to solve the mathematical problems.
- To understand how to use the input output statements, loops, functions, arrays
- To learn debugging concepts.

OUTCOMES:

- Understand and analyze different syntax of C.
- Design a program for a given Problem.
- To analyze and design C Program for a particular problem.

Week 1:
Familiarity with Basic Linux Commands

Week 2:
Using vi editor – Creation of text files

Week 3:
Write simple programs using scanf() and printf() functions and familiarity with format strings.

Week 4:
Write programs to illustrate Operators

Week 5:
Write programs to illustrate If statements

a) To find largest and smallest of given numbers
b) To find the roots of the quadratic equation.

Week 6:

a) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
b) Write a C program to calculate the following Sum:
$Sum=1-x^2/2! + x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$

Week 7:
Write programs on while and do..while loops

a) Program to find the sum of the individual digits of a given positive integer.
b) Program to generate the first n terms of the Fibonacci sequence
c) Program to check the given no is Palindrome or not

Week 8:
Write programs on for loop and nested loops.

a) To generate sum of n natural numbers
b) To generate Pascal triangle
c) To generate all the prime numbers between 1 and n

Week 9 & 10:

a) Program to find the minimum and maximum element of an array.
b) Program to search for given element in an array.
c) Program to convert Binary number to Decimal number and vice-versa.

Week 11:

a) Program to perform Addition of Two Matrices
b) Program to perform Multiplication of Two Matrices

Week 12:

a) Implement string manipulation functions
b) Write a C program to accept a string of any characters and display the number of vowels in that string
c) Display number of words and characters in a string.

Week 13 & 14:

a) Implement categories of user defined functions
b) Implement recursive and non recursive functions
   i. To find the factorial of a given integer.
   ii. To find the GCD (greatest common divisor) of two given integers.

Week 15:
Implementation of parameter passing Techniques

a) Call by value
b) Call by reference

Week 16:
Review and Revision

TEXT BOOKS:

1. C Programming & Data Structures, E. Balagurusamy, 4th Edition, TMH.
2. A Structured Programming Approach using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

REFERENCE BOOKS:

1. Let Us C, Yashavant P. Kanetkar, BPB Publications.
2 Computer System & Architecture, M.Morris Mano, 3rd Edition 2006.
3. Programming in C, Reema Thareja , 2nd Edition Oxford University Press 2015.

L	P	C
0	3	2

ENGINEERING PHYSICS AND CHEMISTRY LAB
(EEE, ECE, CSE and IT)

Engineering Physics Lab:

Any Five Experiments from the following:

1. Torsional Pendulum Experiment – Determination of rigidity modulus of material of wire
2. Melde's experiment
3. Newton's Rings
4. Dispersive Power of the material of a Prism using Spectrometer
5. Stewart & Gee's experiment
6. LED Characteristics
7. Diffraction Grating – Determination of wavelength of monochromatic light
8. RC Circuit – Decay of Charge

ENGINEERING CHEMISTRY LAB

Any six_experiments are to be performed

1. Fundamentals of volumetric analysis : (a) Determination of strength of an acid (HCl)
2. Estimation of ferrous iron by dichrometry
3. Estimation of hardness of water by EDTA method.
4. Determination of alkalinity of water.
5. Determination of free chlorine or chlorides in water.
6. Estimation of copper by colorimetric method.
7. Estimation of HCl by conductometry using standard NaOH solution.
8. Estimation of HCl by potentiometry using standard NaOH solution.
9. Determination of viscosity of sample oil by Redwood/Oswald's viscometer
10. Determination surface tension of lubricants.

TEXT BOOKS:

1. Vogel's Textbook of Quantitative Chemical Analysis.
2. Essentials of experimental engineering chemistry, Shashi Chawla, Dhanpat Rai & Co.
3. Laboratory manual of engineering chemistry, S.K.Bhasin and Sudha Rani , Dhanpat Rai & Co.
4. A text book on experiments and calculations. S.S. Dara, S. Chand & Co.

L	T/P/D	C
0	-/3	1

IT & Engineering Workshop
(ECE, EEE, ME & CIV)

Objectives:

The IT Workshop for engineers is a training lab course spread over 20 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, and Power Point.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets and power point presentations. **(Recommended to use Microsoft office 2007 in place of MS Office 2003)**

OUTCOMES:

- Getting enough knowledge to assemble a computer and identifying various components.
- To get hands on experience in software installation.
- Ability to understand the troubleshooting problems.
- To learn the tools PowerPoint, documentation, tabulation and calculations.
- To get exposure how to use internet and World Wide Web.

PC Hardware

Task 1: Identify the peripherals of a computer, components in a System Cabinet and its functions. Block diagram of the computer along with peripherals.

Task 2: Disassemble and assembling the PC.

MS Word

Task 3: Microsoft (MS) word 2007: Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word. Give a task covering to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colours, Inserting Header and Footer, Inserting table, using Drawing toolbar in word.

MS Excel

Task 4: MS office 2007 Excel as a Spreadsheet tool covering Accessing, overview of toolbars, saving excel files, Using help and resources., Also give a task that is covering the features like Gridlines, Format Cells, Summation, auto fill, Formatting Text.

MS Power Point

Task 5: MS power point:- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in Power point.

REFERENCES:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dream tech.
2. The Complete Computer upgrade and repair book,3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware and A+Handbook Kate J. Chase PHI (Microsoft).
5. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. CISCO Press, Pearson Education.

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ENGINEERING WORKSHOP

Objective: To impart basic knowledge of various tools and their use in different sections of manufacture such as carpentry, Tin-smithy and house wiring.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry
2. Tin-smithy and development of jobs carried out and soldering.
3. House-wiring

2. TRADES FOR DEMONSTRATION & EXPOSURE:

1. Plumbing
2. Power tools in construction, wood working, electrical engineering and mechanical engineering.

TEXT BOOKS:

1. Work shop manual P.Kannaiah / K.L Narayana/scitech publishers.
2. Workshop manual by Venkat Reddy.

Part – C

Syllabi of

B.Tech., I Year II Semester

(ECE and EEE)

English– II

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(COMMON TO ALL BRANCHES)

Semester II

Unit –I: Last Leaf by O Henry
G –Tense & Aspect
V – Synonyms and Antonyms

Unit-II G: Risk Management from Skills Annex -Functional English for Success L - Listening for specific details and information
S- Narrating, expressing opinions and telephone interactions R -Reading for specific details and information

W- Writing formal letters and CVs
Unit-III: The Secret of Work by Swami Vivekananda from "Epitome of Wisdom"
G- Prepositions and Concord, Voice and Reported Speech
V-Collocations and Technical Vocabulary

Unit-IV: Sports and Health from "Skills Annex -Functional English for Success
Critical Listening and Listening for speaker's tone/ attitude
S- Group discussion and Making presentations
R- Critical reading, reading for reference
W-Project proposals; Technical Reports, Project Reports and Research Papers

Unit-V: Convocation Speech by Narayan Murthy, from "Epitome of Wisdom"
G- Writing Memos, Minutes of Meeting, Transcription (Translating from the mother tongue to English), V-Vocabulary - idioms and Phrasal verbs, One-Word Substitutes

REFERENCES:

1. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson.
2. Technical Communication, Meenakshi Raman, Oxford University Press
3. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
4. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw –Hill.

ELECTRICAL CIRCUIT THEORY
(For EEE students only)

Objective:

This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic concepts of circuits which includes single phase circuits, resonance, magnetic circuits, network topology and network theorems.

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 and Triangular). Kirchhoff's Laws, Network Reduction Techniques – Series, Parallel, Series Parallel, Star –to-Delta or Delta-to-Star Transformations, Nodal Analysis, Mesh Analysis, Super node and Super mesh for DC 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.

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

UNIT –IV: Network Topology: Definitions, Graph, Tree, Basic cutest and Basic Tie set Matrices for Planar Networks, Loop and Nodal methods for analysis of Networks with Dependent & Independent Voltage and Current Sources, Duality & Dual Networks.

UNIT –V:
Network Theorems (With A.C. & D.C): Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for D.C and A.C excitations.

TEXT BOOKS:

1. Circuit Theory(Analysis&Synthesis) A.Chakrabarhty, Dhanipat Rai & Sons.2014,6th Edition
2. Network analysis - N.C Jagan and C. Lakhminarayana, BS publications.2011
3. Network Analysis –M.E.Van Valkenburg,PMI Publication.2014,3rd Edition

REFERENCE BOOKS:

1. Engineering Circuit Analysis - William Hayt, Jack E. Kemmerly, S M Durbin, Mc Graw Hill Companies.2011, 8th Edition.
2. Electric Circuit Analysis - K.S.Suresh Kumar, Pearson Education.2013
3. Fundamentals of Electrical Circuits - David A.Bell, Oxford University Press. 2009, 7th Edition.
4. Network Analysis and Circuits - M.Arshad, Infinity Science Press.2010
5. Network Analysis and Synthesis –Ravish R Singh, Mc Graw Hill Education.2013
6. Electrical Circuits: An Introduction - KCA Smith & RE Alley, Cambridge University Press.1992.

Outcome:
After studying this course the student gets a thorough knowledge on basics of circuit concepts, electrical parameters, single phase AC circuits, magnetic circuits, resonance, Network topology which is important in modeling of power system components and network theorems which he/she can apply to the conceptual things in real-world problems and applications.

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ENGINEERING PHYSICS – II
(COMMON TO ALL BRANCHES)

OBJECTIVES:

1. To know fundamentals of Quantum Mechanics, Free Electron Theory of Metals and Band Theory of solids.
2. To know basics of semiconductors and semiconductor devices.
3. To understand superconductivity, applications of optical fibers and fundamentals of Nanoscience.

OUTCOMES:

1. To get an idea to apply Classical and Quantum mechanics in various engineering fields.
2. Able to construct circuits with semiconductor devices and consolidate applications of Nanoscience in the field of Engineering and Technology.
3. To interpret the importance of superconductivity and applications of Optical fiber.

UNIT – I

Free electron theory of metals

Classical Theory– Explanation of Electrical Conductivity and Ohm's Law – Drawbacks, Sommerfeld theory (Qualitative).

Principles of Quantum Mechanics

Waves and Particles, de-Broglie hypothesis Matter waves, Davisson and Germer experiment, Schrodinger Time Independent Wave Equation Wave function and its Physical Significance, Particle in one dimensional potential box (wave functions, probability densities and energy states), Density of States.

UNIT II

Band theory of solids

Electron in a periodic potential – Bloch Theorem, Kronig-Penney model (Qualitative), Origin of energy band formation in solids, Classification of materials into Conductors, Semiconductors & Insulators. Concept of effective mass of an electron.

Fiber optics

Basic principle of optical fiber, Acceptance angle, Acceptance cone, Numerical aperture (Quantitative), Types of optical fiber, Applications of Optical Fiber.

UNIT III

Semiconductor Physics

Intrinsic and Extrinsic Semiconductors, Fermi level in Intrinsic and Extrinsic semiconductors, Carrier Concentration in Intrinsic and Extrinsic Semiconductors. Hall effect, P-N junction diode, Tunnel diode, LED and Photodiode.

UNIT - IV

Superconductivity

Introduction, Heat capacity, Isotopic effect, Persistent currents, Critical fields, Meissner effect, Type I and Type II superconductors, BCS Theory, Josephson effect SQUIDS, Basics of High Temperature Superconductors, Applications of Superconductors.

UNIT V

Fundamental of Nanoscience:

Introduction Basic definitions: Nanoscale, Nanoscience and Nanotechnology, Types of Nanomaterials, Surface to Volume Ratio, Quantum confinement, Synthesis of Nanomaterials Top down & Bottom up approaches: sol-gel, Ball milling and CVD methods, Applications.

TEXT BOOKS:

1. Engineering Physics by P K Palanisamy: Scietech publication.
2. Solid State Physics by M Armugam; Anuradha Publications

REFERENCE BOOKS:

1. Introduction to Solid State Physics by Charles Kittel: John Wiley & Sons.
2. Engineering Physics by R.K.Gaur and S.L.Gupta; Dhanpat Rai and Sons.
3. Engineering Physics by V Rajendran; McGraw hill education private ltd.
4. A Text book of Engineering Physics by M N Avadhanulu, P G Kshirsagar; S Chand.
5. Engineering Physics by K Malik, A K Singh; Tata Mc Graw hill book publishers.
6. Engineering Physics by M.R.Srinivasan, New Age Publishers.

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3	1/-/-	3

C PROGRAMMING – II
(ECE, EEE)

OBJECTIVES:

- To understand the basic concepts such as Abstract data types Linear and Non Linear Data Structures.
- To understand the notations used to analyze the performance of algorithms.
- To understand the behavior of Data Structures such as Unions, Pointers, Files, Stacks and Queues and their representation.
- To choose the appropriate data structure for a specified application.
- To understand and analyze various searching and sorting algorithms.
- To write programs in C to solve problems using Data Structures such as pointers, Strings, Arrays, Searching and sorting and Linear Lists and Linked Lists.

OUTCOMES:

- Learn how to use Pointers, Files and Enumerated data concepts for realistic problems.
- Ability to understand the concept of data structures and its usage.
- Ability to demonstrate the practical applications of Stacks and Queues.
- Ability to solve problems independently and think critically.

UNIT – I

Searching and Sorting – Basic concepts, Searching-Linear and Binary search, Sorting- Selection sort, Bubble sort, & Insertion sort.

UNIT – II

Pointers: Introduction, Declaration and Initialization, Pointer Operators, Pointer to Pointer, Pointer Expressions, Pointers and Arrays- Pointer to Array, Array of Pointers, C programming examples.
Dynamic Memory Allocation Functions- malloc ( ), calloc( ), realloc( ), free()

UNIT – III

Derived types The Type Definition (typedef), Enumerated types, Structures - Declaration, Initialization, Accessing structures, Operations on Structures, Nested Structures, Structures through Pointers, Structures and Functions, Self Referential Structures, Unions ,Bit fields ,C programming examples.

UNIT – IV

File Management Basic concepts, working with text files and binary files, State of a file, Opening and Closing files, File Input / Output functions (standard library input / output functions for files), File status functions (error handling), Positioning functions, Command Line Arguments, C programming examples.

UNIT - V

Linear Data Structures- Stack- Push and Pop operations, Queue- Insertion and Deletion operations, singly linked list- Insertion, deletion operations.

TEXT BOOKS:

1. Computer Programming & Data Structures, E.Balagurusamy, 4th edition, TMH.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F.Gilberg, Third Edition, Cengage Learnimng.

REFERENCE BOOKS:

1. Understanding pointer in C, Yashavant P.Kanetkar, 3rd Edition,BPB Publications 2006.
2. Programming in C, Reema Thareja, 2nd Edition, Oxford University 2015.
3. Theory and Problems of Data Structures, Seymour Lipschutz, Mc Graw Hill, 1986.

MATHEMATICS-II
(COMMON TO CE, EEE, ME, ECE, CSE & IT)

L	T	P	C
4	1	0	3

Pre Requisites: Nil

OBJECTIVES:

1. This course creates the ability to model, solve and interpret any physical or engineering problem
2. To gain knowledge about vector calculus, Fourier series and Fourier transforms to apply in engineering and technologies
3. The course intends to provide an overview of Matrices which occur in physical and engineering problems.
4. This course enhances the conceptual understanding of the learners about the solutions of engineering problems
5. Acquire knowledge about different methods of solution to solve a physical problem.

OUTCOMES:

At the end of the course, the student will be able to:

1. Gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations.
2. Become familiar with the application of ordinary differential equations and vector calculus to engineering problems.
3. Verify the integral theorems.

UNIT-I: Differential Equations of first order and their Applications:

Differential equations of first order and first degree: exact, linear and Bernoulli, Applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT-II: Higher Order Linear Differential Equations and their Applications:

Linear differential equations of second and higher order with constant coefficients, RHS term of the type f(X) = $e^{ax}, \sin ax, \cos ax \text{ and } x^k, e^{ax}V(x), x^kV(x)$ .Method of variation of parameters. Equations reducible to constant coefficients-Cauchy's and Lagrange's differential equations. Applications - Bending of beams, Electrical circuits, simple harmonic motion.

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: Fourier Transforms:

Fourier integral theorem - Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms properties inverse transforms Finite Fourier transforms.

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 function and Volume integral. Vector integrals theorems: Green's Stoke's and Gauss's Divergence Theorems (Only Statements & their Verifications).

TEXT BOOKS:

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
3. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Engineering Mathematics Vol - I, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
4. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley.

REFERENCE BOOKS:

1. Srimanta Pal, Subodh C. Bhunia, (2015), Engineering Mathematics, 1st Edition, New Delhi, Oxford University Press.
2. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.
3. Integral Transforms by A.R.Vasista,Krishana Prakashan Private Limited
4. Schaum's outline series on Vector Analysis; Linear Algebra.
5. Larry C. Andrews and Bhimsen K. Shivamoggi, Integral Transforms for Engineers, Prentice – Hall of India Private Limited, New Delhi.

MATHEMATICS-III
(COMMON TO EEE, ECE, CSE & IT)

L	T	P	C
3	1	0	3

Pre Requisites: Nil

OBJECTIVES

1. The objective is to find the relation between the variables x and y out of the given data (x,y).
2. The aim to find such relationships which exactly pass through data or approximately satisfy the data under the condition of least sum of squares of errors.
3. The aim of numerical methods is to provide systematic methods for solving problems in a numerical form using the given initial data.
4. This topic deals with methods to find roots of an equation and solving a differential equation.
5. The numerical methods are important because finding an analytical procedure to solve an equation may not be always available.
6. In the diverse fields like electrical circuits, electronic communication, mechanical vibration and structural engineering, periodic functions naturally occur and hence their properties are very much required.
7. The aim at forming a partial differential equation (PDE) for a function with many variables and their solution methods. Two important methods for first order PDE's are learnt. While separation of variables technique is learnt for typical second order PDE's such as Wave, Heat and Laplace equations

OUTCOMES:

At the end of the course, the student will be able to:

1. Apply the numerical methods to find a root of algebraic and transcendental equations.
2. Apply the numerical methods to find the solutions of ordinary differential equations.
3. Find the solutions of one dimensional wave equation, two dimensional wave equation and one dimensional heat conduction equation.

UNIT-I: Solution of Non- Linear Equations and Linear System of Equations:

Solution of Algebraic and Transcendental Equations the Bisection Method the Method of False Position the Iteration Method Newton-Raphson Method. Solving system of non-homogeneous equations by L-U Decomposition method (Crout's Method) Jacobi's and Gauss-Seidel Iteration method,

UNIT-II: Interpolation:

Introduction Errors in Polynomial Interpolation Finite differences Forward Differences Backward differences Central differences Symbolic relations and separation of symbols Newton's formulae for interpolation Central difference interpolation Formulae Gauss Central Difference Formulae –Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

UNIT-III: Numerical Integration & Curve Fitting:

Generalized Quadrature (Newton's Cote's formula), Trapezoidal, Simson's and Weddle's rules andproblems. Curve fitting: Fitting a straight line Second degree curve exponentional curve-power curve by method of least squares.

UNIT – IV: 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.

UNIT-V: Partial Differential Equations:

Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (Standard type) equations, Charpits Method, Method of separation of Variables for second order equations. Classification of general second order partial differential equations. Applications of Partial Differential Equations One dimensional wave equation, Heat equation.

TEXT BOOKS:

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
3. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley Publications.

REFERENCE BOOKS:

1. Srimanta Pal, Subodh C. Bhunia, (2015), Engineering Mathematics, 1st Edition, New Delhi, Oxford University Press.
2. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.
3. Introductory Methods of Numerical Analysis. S.S. Sastry, Prentice Hall.
4. Numerical Analysis (Paper IV), First Edition 2010, Telugu Akademi, Hyderabad.
5. Schaum's outline series on Matrices.
6. Mathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.

L	T/P/D	C
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English Language Communication Skills Lab-II

Objectives

1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency in spoken English and neutralize mother tongue influence.
5. To train students to use language appropriately for interviews, group discussion and public speaking

Learning Outcomes:

1. Better Understanding of nuances of language through audio- visual experience and group activities
2. Neutralization of accent for intelligibility
3. Speaking with clarity and confidence thereby enhancing employability skills of the students

Syllabus: English Language Communication Skills Lab shall have two parts:

1. **Computer Assisted Language Learning (CALL) Lab**
2. **Interactive Communication Skills (ICS) Lab**

The following course content is prescribed for the English Language Communication Skills Lab

Exercise-I

CALL Lab: Minimal Pairs
Word accent and Stress Shifts
Listening Comprehension

Exercise-II

ICS Lab: Descriptions- Narrations- Giving Directions and Guidelines
Question Tags and One-Word Substitutes
Concord (Subject in agreement with verb) and Words often misspelt- confused/misused

Exercise-III

CALL Lab: Intonation and Common Errors in Pronunciation.-Neutralization of Mother Tongue Influence and Conversation Practice.

Exercise-IV

ICS Lab: Extempore- Public Speaking
Active and Passive Voice,
Common Errors in English,
Idioms and Phrases

Exercise-V

ICS Lab: Information Transfer
Oral Presentation Skills
Reading Comprehension
Job Application with Resume preparation.

Books Suggested

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation.
2. Nambiar, K.C. 2011. Speaking Accurately. A Coursein International Communication.

L	T/P/D	C
0	-/3	2

C PROGRAMMING II LAB
(ECE, EEE)

OBJECTIVES:

- To write and execute programs in C to solve problems using data structures such as Unions, Pointers, Files, Stack and Queue.
- To write and execute programs in C to implement various sorting and searching methods.

OUTCOMES:

- Ability to identify the appropriate data structure for given problem.
- Able to design and analyze the time and space complexity of algorithm and program.
- Ability to effectively use compilers includes library functions, debuggers and trouble shooting.

Week 1:

a) Implementation of Linear Search
b) Implementation of Binary Search.

Week 2:

a) Implementation of Linear Search & Binary Search using Recursion.
b) Implementation of Bubble Sort.

Week 3:

a) Implementation of Selection Sort
b) Implementation of Insertion Sort

Week 4:

Write programs to illustrate pointers
a) To implement pointer arithmetic
b) To implement pointer to pointer
c) To implement array of pointers

Week 5:

Write C program to illustrate String Handling functions using pointers- to copy, concatenate, compare, reverse and length.

Week 6:

Basic programs in structures- student details, employee details, Inventory management using array of structures.

Week 7:

a) Write C program that uses functions to perform the following operations:
- Reading a complex number
- Writing a complex number
- Addition of two complex numbers
- Multiplication of two complex numbers

(Note: represent complex number using a structure.)

b) Write a C program to illustrate Nested structures

Week 8:

Review and Revision.

Week 9:

a) Write C programs to illustrate Unions
b) Write C programs to illustrate Enumerated data type

Week 10:

a) Write C program to display the contents of a file.
b) Write C program to count the no. of characters ,words and lines of a text file
c) Write C program to implement Command line arguments

Week 11:

a) Write C program to merge two files into a third file (i.e., the contents of the first file Followed by those of the second are put in the third file)
b) Write C program to reverse the first n characters in a file.
(Note: The file name and n are specified on the command line.)

Week 12:

a) Write C program to illustrate Stack operations using arrays
b) Write C program to illustrate Queue operations using arrays

Week 13:

Write C program to implement the operations of Single Linked List

Week 14:

a) Write C program to illustrate Stack operations using Linked List.
b) Write C program to illustrate Queue operations using Linked List

Week 15:

Review and Revision.

TEXT BOOKS:

1. Computer Programming & Data Structures, E.Balagurusamy, 4th edition, TMH.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F.Gilberg, Third Edition, Cengage Learnimng.

REFERENCE BOOKS:

1. Understanding Pointers in C, Yashavant P.Kanetkar, 3rd Edition, BPB Publications. 2006.
2. Programming in C, Reema Tahreja, 2nd Edition,Oxford University Press 2015.
3. Theory and Problems of Data Structures, Seymour Lipschutz, Mc Graw Hill, 1986.

L	P	C
0	3	2

ENGINEERING PHYSICS LAB -II
(EEE and ECE)

The following experiments are to be performed.

1. Numerical Aperture of an Optical Fibre
2. Single slit diffraction – Measurement of wavelength of monochromatic light
3. To determine the diameter of a thin wire by interference in a wedge shape air film.
4. Moment of inertia of fly wheel.
5. Frequency of A.C. mains using sono-meter.
6. Characteristics of Photodiode
7. LCR circuit – Series and Parallel resonance
8. Energy gap of semiconductor

ELECTRICAL AND ELECTRONICS ENGINEERING R15

II YEAR I SEMESTER

COURSE STRUCTURE

Subject Code	Subject Name	L	T	P/D	Total Credits	Total Hours	Total Marks
A13012	Mathematics-IV	3	1	0	3	4	100
A13401	Electronic Devices & Circuits	3	1	0	3	4	100
A13204	Network Theory	4	1	0	4	6	100
A13205	Electro Magnetic Fields	4	1	0	4	5	100
A13206	Electrical Machines –I	4	1	0	4	6	100
A13011	Environmental Science	2	1	0	2	3	100
A13281	Basic Simulation Tools Lab	-	-	3	2	3	75
A13282	Electrical Circuits Lab	-	-	3	2	3	75
MC-I	Mandatory Course –I	**2**	**0**	**0**	**0**	**2**	**75**
	Total	**22**	**8**	**6**	**24**	**36**	**825**

II YEAR II SEMESTER

COURSE STRUCTURE

Subject Code	Subject Name	L	T	P/D	Total Credits	Total Hours	Total Marks
A14407	Electronic Circuits	3	1	0	3	4	100
A14408	STLD	3	1	0	3	4	100
A14311	Fluid Mechanics and Hydraulic Machines	3	1	0	3	4	100
A14208	Electrical Machines-II	4	1	0	4	5	100
A14209	Power Systems-I	3	1	0	3	4	100
A14210	Control Systems	4	1	0	4	5	100
A14283	Electrical Machines Lab-I	-	0	3	2	3	75
A14484	Electronic Devices and Circuits lab	-	0	3	2	3	75
MC-II	Mandatory Course –II	**2**	**0**	**0**	**0**	**2**	**75**
	Total	**22**	**6**	**6**	**24**	34	825

MATHEMATICS-IV
(COMMON TO EEE & ECE)
(SPECIAL FUNCTIONS AND FUNCTIONS OF A COMPLEX VARIABLE)

L	T/P/D	C
3	1 0	3

Pre Requisites: Nil

Course Objectives: To learn

1. Series solutions for Legendre differential equation, analyzing the properties of Legendre polynomials.
2. Differentiation and Integration of complex valued functions.
3. Evaluation of integrals using Cauchy's integral formula.
4. Taylor's series, Maclaurin's series and Laurent's series expansions of complex functions.
5. Evaluation of integrals using residue theorem.
6. Transform a given function from z - plane to w – plane.
7. Identify the transformations like translation, magnification, rotation and reflection and inversion.
8. Properties of bilinear transformations.

Course Outcomes: After going through this course the student will be able to:

1. Identify Bessel equation and solve it under special conditions with the help of series solutions method. Also recurrence relations and orthogonality properties of Legendre polynomials.
2. Analyze the complex functions with reference to their analyticity, Integration using Cauchy's integral theorem,
3. Expansion of a given function as a Taylor's and Laurent series
4. Solving Real Definite Integrals using Cauchy's Residue Theorem.

UNIT-I

Legendre's Polynomials

Introduction to series solution of differential equations. Legendre's Differential equation, General solution of Legendre's equation, Legendre's polynomials and their Properties: Rodrigue's formula – Recurrence relations, generating function of Legendre's polynomials – Orthogonality.

UNIT-II

Complex Functions –Differentiation

Complex functions and its representation on argand plane, Concepts of limit Continuity, Differentiability, Analyticity, Cauchy-Riemann conditions, Harmonic functions– Milne – Thompson method, complex potential functions, stream functions and velocity functions.

UNIT-III

Complex Integration & Complex Power series

Complex Integration:

Line integral evaluation along a path, Cauchy's integral theorem, Cauchy's integral formula – Generalized integral formula.

Complex Power series

Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent's series. Singular point –Isolated singular point – pole of order m – essential singularity.

UNIT-IV

Residue and Contour Integration

Residue – Evaluation of residue by formula and by Laurent's series – Residue theorem.

Evaluation of integrals of the type:

(a) $\int_0^{2\pi} f(\cos\theta, \sin\theta)\, d\theta$ (b) Improper real integrals $\int_{-\infty}^{\infty} f(x)\, dx$ (c) Indetation by Contour Integration.

UNIT-V

Conformal mapping

Transformation of z-plane to w-plane by a function, conformal transformation. Standard Transformations-Translation; Magnification and rotation; inversion and reflection, Transformations like e^z, log z, z^2, and bilinear transformation. Properties of Bilinear transformation, determination of bilinear transformation when mappings of 3 points are given.

TEXT BOOKS

1. Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.
3. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.

REFERENCES

1. Complex Variables Principles and Problem Sessions by A.K.Kapoor, World Scientific Publishers
2. A Text Book of Engineering Mathematics by N P Bali, Manesh Goyal
3. Mathematics for Engineers and Scientists, Alan Jeffrey, 6th Edit. 2013, Chapman & Hall/CRC
4. Advanced Engineering Mathematics, Michael Greenberg, Second Edition, Person Educations.
5. Schaum's Outline Series on Complex Variables

ELECTRONIC DEVICES AND CIRCUITS

L	T	P	C
3	1	0	3

Course Objectives:

This is a fundamental course, basic knowledge of which is required by all the circuit branch engineers. This course focuses:

1. To familiarize the student with the principle of operation, analysis and design of Junction diode, BJT and FET transistors and amplifier circuits.
2. To understand diode as rectifier. To study basic principle of filter circuits and various types.

Course Outcomes:

1. After going through this course the student will be able to:
2. Understand and analyze the different types of diodes, operation and its characteristics Design and analyze the DC bias circuitry of BJT and FET Design biasing circuits using diodes and transistors.
3. To analyze and design diode application circuits, amplifier circuits and oscillatorsemploying BJT, FET devices.

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 Semiconductor Diodes, Zener Diode Characteristics.

Special Purpose Electronic Devices: Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram), Varactor Diode, SCR and Semiconductor Photo Diode, UJT and Characteristics.

UNIT-II: 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-III: Bipolar Junction Transistor:

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

BJT Small Signal Model: BJT Hybrid model, Determination of h-parameters from Transistor Characteristics, Analysis of a Transistor Amplifier Circuit using h- Parameters.

UNIT-IV: 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-V: Field Effect Transistor and Biasing:

Field Effect Transistor: The Junction Field Effect Transistor (Construction, principle of operation, symbol) – Pinch-off Voltage - Volt-Ampere characteristics, FET as Voltage Variable Resistor, The

JFET Small Signal Model, MOSFET (Construction, principle of operation, symbol), MOSFET Characteristics in Enhancement and Depletion modes. Biasing FET, Comparison of BJT and FET.

TEXT BOOKS:

1. Millman's Electronic Devices and Circuits – J. Millman, C.C.Halkias, and Satyabrata Jit, 2 Ed., 1998, TMH.
2. Electronic Devices and Circuits – Mohammad Rashid, Cengage Learing, 2013.
3. Electronic Devices and Circuits – David A. Bell, 5 Ed, Oxford.

REFERENCES:

1. Integrated Electronics – J. Millman and Christos C. Halkias, 1991 Ed., 2008, TMH.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, 9 Ed., 2006, PEI/PHI.
3. Electronic Devices and Circuits – B. P. Singh, Rekha Singh, Pearson, 2Ed, 2013.
4. Electronic Devices and Circuits - K. Lal Kishore, 2 Ed., 2005, BSP.
5. Electronic Devices and Circuits – Anil K. Maini, Varsha Agarwal, 1 Ed., 2009, Wiley India Pvt. Ltd.
6. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, A.Vallavaraj, 2 Ed., 2008, TMH.

NETWORK THEORY

L	T	P	C
4	2	0	4

Course Objective:

This course introduces the basic concepts of circuit analysis which is the foundation for all of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes three phase circuits, two port networks, transient analysis, Filters and Fourier analysis.

Course Outcomes:

After going through this course the student will be able to understand

- Fundamentals on Calculation of power in three phases balanced and unbalanced networks.
- How to find Transient response of different circuits using Laplace and differential for simple electrical circuits.
- Behavior of linear circuits using Laplace transform and transfer function of single port and two port networks, Design of filters, Fourier analysis of AC circuits.

UNIT –I: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 three phase circuitsMeasurement of active and reactive power.

UNIT-II: D.C and A.C Transient Analysis

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

UNIT-III: 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, Network 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 function, Necessary conditions for transfer functions, Time domain response from pole-zero plot.

UNIT-IV: Network Parameters

Two port network parameters- Z, Y, ABCD and Hybrid parameters and their inter relations. Series, parallel and cascaded connection of two port networks, Concept of transformed network-Two port network parameters using transformed variables.

UNIT-V: Filters and Fourier analysis of AC Circuits

Low pass, High pass, Band pass, Band Elimination, Prototype filter design. The Fourier theorem, consideration of symmetry, trigonometric and exponential form of Fourier series, line spectra and phase angle spectra.

TEXT BOOKS

1. Circuit Theory Analysis &Synthesis - *A.Chakrabarthy*, Dhanpat Rai & Sons, 2010.
2. Circuits & Networks: Analysis and Sythesis- *A.Sudhakar and Shyammohan S.Palli*, Tata McGraw Hill, 2015, 5th Edition.

REFERENCE BOOKS

1. Electric Circuit analysis - *B.Subrahmanyam*, I.K International
2. *Network* analysis -Mahmood Naqvi,*Joseph Edminister*, Schaum's Outlines, 4th edition, McGraw-Hill Companies, Incorporated, 2003.
3. Network Analysis - *M.E Van Valkenberg*. Prentice-Hall, 1974.
4. Electric circuit analysis - *C.L.Wadhwa*, New Age International, 2006.
5. Electrical circuits theory-K.*Rajeswaran*, Pearson Education, 2004.
6. Basic circuit's analysis - *D.R Cunningham. & J.A. Stuller*, Jaico Publications, 1993.

ELECTRO MAGNETIC FIELDS

L	T	P	C
4	1	0	4

Course Objective:

The objective of this course is to introduce the concepts of electric field and magnetic fields and their advantages & applications which will be utilized in the development of the theory for power transmission lines and electrical machines.

Course Outcomes:

After going through this course the student will be able to understand

- Ability to apply vector mathematics and physics to calculate parameters electromagnetic problems.
- Properties and behavior of conductors, dielectrics & capacitance.
- Magneto statics and Physical laws of electro magnetism, Force in magnetic fields, Magnetic potential and its properties.
- Calculation of inductance, Basic concepts on time varying fields in Integral form and point form.

UNIT – I: Electrostatics

Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems – Divergence theorem. Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential– Properties of potential function – Potential gradient – Guass's law – Application of Guass's Law – Maxwell's first law. Laplace's and Poison's equations – Solution of Laplace's equation in one variable.

UNIT – II: Conductors, Dielectric & Capacitance

Conductors –Insulators – Semiconductors – Behaviour of conductors in an electric field – Behaviour of Insulators in an electric field – Electric Dipole – Dipole moment – Polarization – potential and EFI due to an electric dipole and Torque.

Dielectric – Conductor and Dielectric to Dielectric 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 – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

UNIT – III: Magneto Statics, Ampere's circuital law

Static magnetic fields – Biot-Savart's law – 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.

Ampere's circuital Law & Applications:

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-Curl-Stroke's Theorem – Maxwell's third equation, Field due to a circular, rectangular and square loops.

UNIT –IV: Force in Magnetic fields, Magnetic Potential

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.

Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations.

UNIT – V: Inductance, Time Varying Fields

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.

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation – Statically and dynamically induced EMFs – Simple problems Modification of Maxwell's equations for time varying fields – Displacement current – Pointing Theorem and pointing vector.

TEXT BOOKS

1. Engineering Electromagnetic - *William H. Hayt & John. A. Buck* McGraw Hill Companies, 7th Edition, 2012.
2. Electromagnetic Fields - *Sadiku*, Oxford Publications, 7th edition, 2006.

REFERENCE BOOKS

1. Introduction to Electro Dynamics - *D J Griffiths*, Prentice-Hall of India Pvt. Ltd, 2nd editon, 1989.
2. Electromagnetic - *J P Tewari*, Khanna Publishers, 2nd edition, 2005.
3. Electromagnetics - *J. D Kraus*, McGraw Hill Inc, 4thedition 1992.
4. Electromagnetic fields - *S. Kamakshaiah*, Right Publishers, 2007.

ELECTRICAL MACHINES-1

L	T	P	C
4	2	0	4

Course Objective:

The objective of the course is to provide the student with lucid and comprehensive treatment of the most important Direct Current machines (motors and generators). This course emphasizes the physical understanding of the basic principles underlying the operation and performance of DC machines.

Course Outcomes:

After going through this course the student will be able to understand

- Construction of D.C machine, different types of DC generators their characteristics, industrial applications, effect of armature reaction and its assessment.
- The principle of DC motor, electrical characteristics and industrial applications, purpose of starter and its design, speed control methods.
- Various losses, different tests in DC machines and calculation of their efficiency. **Unit – I:**

D.C. Generators – Construction & Operation

Electromechanical Energy conversion – force and torque in magnetic field systems – energy balance- D.C. Generators – Principle of operation – Action of commutator – constructional features – classification of DC generators – separately excited and self excited generators – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation – Armature reaction and commutation – cross magnetizing and demagnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

Unit –II: Operating Characteristics of D.C. Generators

Build up of EMF – magnetization curve/occ characteristics – critical field resistance and critical speed – causes for failure of self excitation – remedial measures – internal and external characteristics of d.c shunt, series and compound generators – parallel operation of d.c series generators – use of equalizer bar and cross connection of field windings – load sharing. Different applications of D.C Generators

Unit – III: D.C. Motors

D.C Motors – Principle of operation – Back E.M.F. - Torque equation

Unit IV: Types of D.C Motors and Speed Control

Types of D.C Motors (shunt, series and compound) – classification of motors (shunt, series and compound) – principle of operation of 3 point and 4 point starters with protective devices – Speed control of D.C. Motors: armature voltage and field flux control methods – Ward-Leonard system.

Different applications of D.C Motors.

Unit – V: Testing of D.C. Machines

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- *P.S. Bimbra*, Khanna Publishers, 7th edition, 2010,
2. Theory and performance of Electrical machines – *J.B Gupta*, S.K Kataria & Sons publishers, 2009.

REFERENCE BOOKS

1. Electrical Machines – *S.K. Bhatta Charya*, McGraw Hill Companies, 2007.
2. Electrical Machines - *I.J. Nagrath & Kothari*, McGraw Hill Companies, 3rd edition, 2004.
3. Electric Machines – *M.V. Deeshpande*, Wheeler Publishing, 1997.
4. Electrical machinery - *A.E. Fritzgerald C. Kingsley and S. Umans*, McGraw Hill Companies, 5th edition, 2010.

ENVIRONMENTAL SCIENCE

Common to all Branches

L	T	P/D	C
2	1	0	2

Course Objectives

- Develop an understanding on the importance of environmental protection.
- Understanding the significance of ecological balance for sustainable development.
- The ability to apply quantitative reasoning and practical skills to environmental problems.

Course Outcomes:

At the end of the course, the student will be able to:

- To enable the students to realize the importance of the sustainable use of natural resources.
- To make the students aware of the impacts of human actions on environment and measures to minimize and mitigate them.
- To enable the students to become aware of the current issues and problems pertaining to the environment.

UNIT I:

Ecosystems:
Definition, Scope and Importance of ecosystem; Classification of ecosystems, Structure and Functions of ecosystem: Food chains, Food Web and Ecological Pyramids, Flow of energy; Bioaccumulation and Biomagnifications; Ecosystem Value services and Carrying Capacity. **Biodiversity and Biotic Resources:** Introduction, Definition, levels of Biodiversity, Value of biodiversity, Hot spots of biodiversity, Threats to biodiversity, conservation of biodiversity: In-Situ and Ex-situ conservation.

UNIT II:

Natural Resources: Classification of Resources, **Water resources:** use and over utilization of surface and ground water, Floods and Droughts, Dams: benefits and problems. **Energy resources:** growing energy needs, Renewable Energy Sources – Solar, Hydro-Power, Wind, Tidal, GeoThermal, Biomass, Bio-fuels, Hydrogen as a fuel and Biogas and Non Renewable Energy – Coal,
Petroleum, LPG, Natural Gas, SNG, CNG. **Land resources:** land as a resource, land degradation – Landslide and Soil Erosion; **Forest Resources – Uses and Exploitation.**

UNIT III:

ENVIRONMENTAL POLLUTION AND CONTROL: Types of Pollution, Sources, Effects and Control measures and Quality Standards for

1. Air Pollution
2. Water Pollution
3. Soil Pollution

4. Noise Pollution

Solid, Hazardous, Biomedical and e-Waste Management and Handling Rules, Nuclear Hazards – Case Studies. **Waste water treatment methods:** Effluent treatment plants (ETP), Sewage treatment plants (STP), Common and combined effluent treatment plants (CETP).

UNIT IV:

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); Aid Rains, Deforestation and Desertification.

Environmental Impact Assessment (EIA): Definition of Impact: classification of impacts, Methods of baseline data acquisition. Impacts on different environmental components; Environmental Impact Statement (EIS). Environmental Management Plan (EMP) - Rain Water Harvesting, Water Shed Management and Bioremediation.

UNIT V:

Environmental Policy, Legislation, Rules And Regulations: Environmental Protection act, Legal aspects Air (Prevention and Control of pollution) Act- 1981, Water (Prevention and Control of pollution) Act-1974, Forest Conservation Act, Wildlife Act 1972. **Towards Sustainable Future:** Concept of Sustainable Development, Threats to Sustainability: Population and its explosion, Crazy Consumerism, Over-exploitation of resources; Environmental Education, Role of Civil Societies, Role of IT in Environment, Smart Cities, Concept of Green Building, Low Carbon Lifestyle, Life cycle assessment and Ecological Foot Print.

TEXT BOOKS:

1. Text Book of Environmental Studies by Anubha Kaushik (4th Edition), New age International Publishers.
2. Environmental studies by Erach Bharucha 2005, University Grants Commission, University Press.
3. Environmental studies, from crisis to cure by R. Rajagopalan, 2005.

REFERENCE BOOKS:

1. Environmental Science: Towards a Sustainable Future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Science by Daniel B. Botkin & Edward A. Keller, Willey INDIA Edition.
3. Text book of Environmental Science and Technology by M. Anji Reddy 2007.

BASIC SIMULATION TOOLS LAB

L	T	P	C
0	0	3	2

Any Ten experiments should be conducted

Demo of basic commands & operators of MAT LAB & study of PSPICE.

Using MATLAB Software

1. Development of MATLAB Program for Matrix multiplication and inversion
2. Mesh and nodal analysis of circuit excited by DC Source.
3. Analysis of RL series circuit using simulink model on DC and AC Excitation.
4. Analysis of RC series circuit using simulink model on DC and AC Excitation.
5. Analysis of RLC series circuit using simulink model on DC and AC Excitation.
6. Simulink model of diode.
7. Simulink model of SCR.
8. Determination of band width and quality factor of a Series RLC circuit.

Using PSPICE Software

1. Development of PSPICE program to determine the Thevenins voltage of given network Development of PSPICE program of 1- half wave rectifier.
2. Development of PSPICE program of 1- full wave rectifier.
3. Transient response of RL series circuit excited by DC and AC Source.
4. Transient response of RC series circuit excited by DC and AC Source DC Source.
5. Transient response of RLC series circuit excited by DC and AC Source DC Source.

II Year B.Tech. EEE I-Sem

ELECTRICAL CIRCUITS LAB

L	T	P/D	C
0	0	3	2

Any Ten experiments should be conducted

1) Measurement of Voltage, Current and Equivalent Resistance of Various Circuits and verification of Kirchhoff's laws.
2) Verification of Thevenin's Theorem &Verification of Norton's Theorem.
3) Verification of Maximum Power Transfer Theorem on DC and AC Excitation for different loads(R,RL,RLC)
4) Verification of Compensation Theorem &Verification of Superposition theorem.
5) Verification of Reciprocity Theorem &Verification Millmann's Theorem.
6) Resonance in series and parallel R, L, C Circuits.
7) Determination of Self inductance, Mutual inductance and Coefficient of coupling
8) Current locus Diagrams of RL and RC Series Circuits
9) Calculation of RMS, Average Value, Form Factor and Peak Factor of Complex wave
10) Determination of Z & Y Parameters
11) Determination of Transmission & Hybrid Parameters
12) Measurement of Active power for star and delta connected balanced loads
13) Measurement of Reactive power for star and delta connected balanced loads

Part – C

Syllabi of

B.Tech., II Year II Semester

II Year B.Tech. EEE II - Sem.

ELECTRONIC CIRCUITS

L	T	P	C
3	1	0	3

Course Objectives:

1. To introduce circuit realizations with components such as diodes, BJTs and transistors studied earlier.
2. To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
3. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.

Course Outcomes:

1. After going through this course the student will be able to:
2. Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier.
3. Cascade different amplifier configurations to obtain the required overall specifications like Gain, Bandwidth,
4. Input and Output interfacing Impedances.
5. Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
6. Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations.

UNIT – I:

Single Stage and Multi Stage Amplifiers

Single Stage Amplifiers: Classification of Amplifiers – Distortion in amplifiers, Analysis of CE, CC, and CB Amplifiers and CE Amplifier with emitter resistance, Miller's Theorem and its dual.
Multi Stage Amplifiers: Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair, and Different coupling schemes used in amplifiers- RC Coupled amplifiers, Transformer Coupled amplifiers and Direct Coupled amplifiers.

UNIT – II:

BJT Amplifiers and FET Amplifiers

BJT Amplifiers: Logarithms, Decibels, General frequency considerations, Frequency response of BJT amplifier – Analysis at low and high frequencies,effect of coupling and bypass capacitors, The Hybrid- pi ( ) – Common Emitter transistor model, CE short circuit current gain, current gain with resistive load, Single stage CE transistor amplifier response, Gain-bandwidth product, Equivalent Circuit of Emitter Follower at higher frequencies.

FET Amplifiers: Basic Concepts, Analysis of CS, CD, CG JFET Amplifiers, Common Source Amplifier with Source resistance.

UNIT –III:

Feedback Amplifiers and Oscillators

Feedback Amplifiers: Classification of amplifiers, Concepts of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

Oscillators: Classification of oscillators, Condition for oscillations, RC-phase shift and Wienbridge oscillators. Generalized analysis of LC oscillators- Hartley and Colpitts Oscillators, Crystal Oscillator, stability of oscillators

UNIT – IV:

Large Signal Amplifiers:

Classification of Power Amplifiers, Class A Power Amplifier, Maximum Value of Efficiency of Class – A Amplifier, Transformer Coupled Amplifier, Class B Power Amplifier, Efficiency of Class B Amplifier, Push Pull and Complimentary Symmetry Class B and Class AB Power Amplifiers – Principle of operation of class – C Amplifier, Distortion in power amplifiers, Transistor Power Dissipation, Heat Sinks.

UNIT – V:

Tuned Amplifiers

Introduction, Q-Factor, Small Signal Tuned Amplifiers with coupling techniques, Effect of Cascading single Tuned amplifiers on Bandwidth, Effect of Cascading Double Tuned amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned amplifiers'

TEXT BOOKS:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, TMH
2. Electronic Devices and Circuits, David A. Bell – 5th Editions, Oxford.
3. Electronic Devices and Circuits, S. Salivahanan, N.Suresh Kumar, AVallvaraj, 2nd Edition, TMH.

REFERENCES:

1. Introductory Electronic Devices and Circuits (Conventional flow version) – Robert T. Paynter, 7th Edition, 2009, PEI.
2. Microelectronic Circuits – Sedra / Smith – 5th Edition – Oxford, 2009
3. Electronic Circuit Analysis – K. Lal Kishore, BS Publications, 2004.
4. Electronic Devices and Circuits, Anil.K. Maini, Varsha Agrawal, 1st Edition, WILEY.
5. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nashelsky, 9th Edition, Pearson Education.

II Year B.Tech. EEE II-Sem.

SWITCHING THEORY AND LOGIC DESIGN

L	T	P	C
3	0	0	3

Course Objectives:

This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit. The main objectives are:

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
3. To implement simple logical operations using combinational logic circuits
4. To design combinational logic circuits, sequential logic circuits.
5. To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
6. To implement synchronous state machines using flip-flops.

Course Outcomes:

After going through this course the student will be able to:

1. Manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray and BCD.
2. Manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
3. Design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
4. Design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

UNIT-I: Number System and Boolean algebra And Switching Functions:
Review of number systems, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Error Detecting and Correcting Codes.

Boolean Algebra: Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT-II: Minimization and Design of Combinational Circuits:
Introduction, The Minimization of switching function using theorem, The Karnaaugh Map MethodUp to Five Variable Maps, Don't Care Map Entries, Tabular Method, VEM method, Design of Combinational Logic: Adders, Subtractors, comparators, Multiplexers, Demultiplexers, Decoders, Encoders and Code converters, Hazards and Hazard Free Relations.

UNIT-III: Sequential Machines Fundamentals and Applications:
Introduction: Basic Architectural Distinctions between Combinational and Sequential circuits, The Binary Cell, Fundamentals of Sequential Machine Operation, Latches, Flip Flops: SR, JK, Race Around Condition in JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Design of a Clocked Flip-Flop, Timing and Triggering Consideration, Clock Skew, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers, Data Transmission in Shift Registers, Operation of Shift Registers, Shift Register Configuration, Bidirectional Shift Registers, Applications of Shift Registers, Design and Operation of Ring and Twisted Ring Counter, Operation Of Asynchronous And Synchronous Counters.

UNIT-IV: Sequential Circuits-I:

Introduction, State Diagram, Analysis of Synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Synthesis of Synchronous Sequential Circuits, Serial Binary Adder, Sequence Detector, Parity-bit Generator, Design of Asynchronous Counters, Design of Synchronous Modulo N-Counters.

UNIT-V: 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.

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 and Finite Automata Theory- ZviKohavi&Niraj K. Jha, 3rdEdition, Cambridge.
2. Digital Design-Morris Mano, MachaelCilette, Pearson Education, 2013.
3. Switching Theory and Logic Design – An Anand Kumar, PHI, 2013.

REFERENCES:

1. Digital Design- Morris Mano, PHI, 3rd Edition.
2. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed, John Wiley & Sons Inc.
3. Digital Fundamentals – A Systems Approach – Thomas L. Floyd, Pearson, 2013.
4. Digital Logic Design - Ye Brian and HoldsWorth, Elsevier
5. Fundamentals of Logic Design- Charles H. Roth, Cengage LEanring, 5th, Edition, 2004.
6. Digital Logic Applications and Design- John M. Yarbrough, Thomson Publications, 2006.
7. Digital Logic and State Machine Design – Comer, 3rd, Oxford, 2013.

CONTROL SYSTEMS

L	T	P	C
4	1	0	4

Course Objective:

In this course it is aimed to introduce to the students the principles and applications of control systems in day to day life. The basic concepts of block diagram reduction, time domain analysis, solutions to time invariant systems, different aspects of stability analysis of systems in frequency domain and time domain are dealt with.

Course Outcomes:

After going through this course the student will be able to understand

- The basic concepts and applications of control systems in day to day life.
- The transfer function analysis in mathematical modeling of control system which helps mainly in stability and designing of control systems.

UNIT – I: Introduction

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems.
Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

UNIT II: Transfer Function Representation and Time Response Analysis

Transfer Function of DC Servo motor - AC Servo motor- Synchro Transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction uses Mason's gain formula.
Feed-Back Characteristics, Effects of feedback, standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT –III: Stability Analysis in S-Domain

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

Root Locus Technique:

The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT – IV: Frequency Response and Stability Analysis In Frequency Domain

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain marginStability Analysis from Bode Plots. Nyquist Plots-Stability Analysis.

UNIT – V: Classical Control Design Techniques and State Space Analysis of Continuous Systems

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers.

Concepts of state, state variables and state model, derivation of state models - Solving the Time invariant state Equations- State Transition Matrix and its Properties

TEXT BOOKS:

1. Control Systems Engineering – I.J.Nagrath and M.Gopal, New Age International (P) Limited, Publishers, 2nd edition, 2009.
2. Automatic Control Systems - B. C. Kuo, John wiley and sons. 8th edition, 2003.

REFERENCE BOOKS:

1. Modern Control Engineering –Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd Edition, 1998.
2. Control Systems-N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems Engg. -– John wiley, NISE, 4rd edition, 2007.
4. Control Systems – Nagoorkani, 1998.

FLUID MECHANICS AND HYDRAULIC MACHINES

L	T	P/D	C
3	1	0	3

Course Objective:

1. Understanding the properties of fluids and Calculating forces on a submerged structure in a static fluid.
2. Applying the mass conservation, Energy and Momentum principle, using the control volume approach, to engineering problems.
3. Calculating surface resistance in laminar, turbulent flows and lift and drag forces on moving bodies.
4. Students should know the inter relationship between thermodynamics and fluid mechanics in context to their respective departments.
5. To prepare students, will be broadly educated and will have an understanding of the impact of engineering on society and demonstrate awareness of contemporary issues.
6. To train the students will be familiar in applying software methods to analyze mechanical engineering problems.

Course Outcomes:

1. Solving numerical problems related to pressure measuring instruments, identifying and solving forces on submerged and floating bodies.
2. Practical application of Bernoulli's equation and principles in various disciplines including pressure variation study in atmospheric science.
3. Ability to apply conservation laws for mass, momentum and mechanical energy in combination to control volumes in ideal fluids and hence calculate hydraulic and energy grade lines.
4. Calculation of local and overall skin friction drag in laminar and turbulent flat plate boundary layers, using approximate empirical formula (only basic knowledge).
5. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice with the concept of Hydraulic Machinery and Systems.

UNIT – I

Fluid Properties and Fluid Statics: Density, Specific weight, Specific gravity, viscosity, Vapour pressure, compressibility, Surface tension Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Hydro static law, Piezometer, Simple and differential manometers.

UNIT - II

Fluid Kinematics: Stream line, path line, streak line, stream tube, classification of flows, steady,unsteady, uniform, non-uniform, laminar, turbulent, rotational, irrigational flows, one, two and three dimensional flows.

Fluid Dynamics: Surface and Body forces, Euler's and Bernoulli's equation derivation, Application of Bernoulis Equation: Venturimeter, Orifice meter, Pitot tube, Navier stokes equation (explanation only), Momentum equation – applications.

UNIT - III

Close Conduit Flow: Reynolds Experiment, Darcy's equation, Minor losses - pipes in series, pipes in parallel, total energy line and hydraulic gradient line, numerical problems.

Boundary Layer Concepts: Definition, thicknesses, characteristics along thin plate, laminar and turbulent layers (No Derivation) boundary layer in transition, separation of boundary layer submerged objects drag and lift.

UNIT – IV

Impact Of Water Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and a tip-velocity triangles at inlet and outlet expressions for work done and efficiency, Series vanes, Radial flow turbines.

Hydraulic Turbines: Overshot and undershot water wheels, classification of Water turbines, Pelton Wheel, work done and working proportions, Francis, Kalpan turbines, draft tubes, types & its efficiency.

Performance Of Turbines: Performance under unit head, unit quantities, performance under specific conditions, specific speed, performance characteristic curves, model testing of turbines, cavitation, governing of turbines, surge tanks. Water hammer.

UNIT – V

Centrifugal Pumps : Types Component parts and working, work done by the impeller, Manometric head losses and efficiencies, minimum starting speed, loss of head due to reduced or increased flow, diameters of impeller and pipes, Specific speed, Model testing of pumps, Multistage Pumps, Pumps in parallel, performance of pumps, characteristics curves, NPSH, Cavitation, priming devices, pump troubles and remedies.

Reciprocating Pumps: Main components and working of a reciprocating pump, types of reciprocating pumps, power required driving the pump, coefficient of discharge and slipping indicator diagram.

TEXT BOOKS:

1. Hydraulics, fluid mechanics and Hyraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

REFERENCES:

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.

ELECTRICAL MACHINES – II

L T P C
4 1 0 4

Course Objective:

As an extension of Electrical machines I course this subject facilitates to learn the performance of Transformers and Induction motors which are having very wide applications in the field and industry.

Course Outcomes:

After going through this course the student can be able to understand

- Construction, working principle, operating characteristics of single phase and3-phase transformers. Able to solve the problems about regulation, efficiency, Sharing of load in parallel operation.
- Construction, working principle, speed torque characteristics of 3-phase induction motors, solution of problems at different loads, speed control methods and their applications.
- Upon completing the course, students will be able to understand the construction and operation of single phase induction motors and their applications.

UNIT-I: Single phase transformers:

Principle of operation –Turns Ratio-Types - constructional details- Losses: Hysterisis, Eddy currentcopper losses. Minimization of hysteresis and eddy current losses- E.M.F equation - operation on no load and on load - phasor diagrams.

Equivalent circuit – efficiency-Condition for maximum efficiency- All day efficiency -voltage regulation for different loads (power factors) - effect of variations of frequency & supply voltage on iron losses.

Testing of transformers: OC and SC tests –Drawing of Equivalent Circuit- Sumpner's test - predetermination of efficiency and voltage regulation-separation of losses.

UNIT II:

Three phase Transformers

Three phase poly-phase connections - Y/Y, Y/□, □/Y, □/□ and open□, Third harmonics in phase voltages-three winding transformers-tertiary windings. Determination of Zp, Zs and Zt transients in switching - off load and on load tap changing; Scott connection.

Parallel Operation and Autotransformers

Parallel operation of Single Phase Transformers with equal and unequal voltage ratios. Auto transformers-equivalent circuit - comparison with two winding transformers.

UNIT III: Three Phase Induction Motors

Construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor reactance, rotor current and pf. at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed. Torque equation- expressions for maximum torque and starting torque - torque slip

characteristics - double cage and deep bar rotors - equivalent circuit - phasor diagram - crawling and cogging.

UNIT IV: Performance of Three Phase Induction Motors

Circle diagram-no load and blocked rotor tests-predetermination of performance. Methods of starting. Calculations of torque, efficiency at different loads from circle diagram.

Speed control-change of frequency- change of poles and methods of consequent poles; cascade connection, injection of an emf into rotor circuit (qualitative treatment only)-induction generatorprinciple of operation.

UNIT V: Single Phase Induction Motors:

Single phase Induction motor – Constructional features- Cross field theory, Double revolving field theory Equivalent circuit- spilt –Phase motors- Capacitor start Capacitor run motors.

TEXT BOOKS:

1. Electric Machinery- *P.S. Bimbra*, Khanna Publishers, 7th edition, 2010.
2. Theory and Performance of Electrical Machines - *JB Gupta*, SK Kataria & lSons, 2009.

REFERENCE BOOKS:

1. Performance and Design of AC Machines - *MG.Say*, BPB Publishers, 1968.
2. Theory of Alternating Current Machinery- *Langsdorf*, Tata McGraw Hill Companies, 2nd edition, 2001.
3. Electro mechanics-ll (transformers and induction motors) - *S. Kamakashaiah*, Hitech publishers.
4. Electric Machines – *I.J.Nagrath & D.P.Kothari*,Tata McGraw Hill, 7th Edition, 2005.
5. A Text Book of Electrical Technology – *B.L. Theraja and A.K. Theraja,Vol2*,S.Chand Publications

II Year B.Tech. EEE II-Sem

L	T	P	C
3	1	0	3

POWER SYSTEMS-I

Course Objective:

Electrical Power plays significant role in day to day life of entire mankind. This course deals with the generation and distribution of power along with the economic aspects.

Course Outcomes:

After going through this course the students will be able to understand

- *How the electrical power will be generated from different sources.*
- *Layout of substations, their Equipments and distribution systems.*
- *The economical aspects of power generation and different types of tariffs.*

UNIT-I:ThermalPowerStations:

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.

NuclearPowerStations:

NuclearFissionandChainreaction,Nuclearfuels,Principle of operation of Nuclear reactor, Reactor Components- Moderators,Controlrods,ReflectorsandCoolants, Radiationhazards-ShieldingandSafetyprecautions,TypesofNuclearreactorsandbriefdescriptionofPWR,BWR andFBR.

Gas Power Stations:

Principle of Operation and Components(BlockDiagram ApproachOnly).

UNIT-II:GeneralAspects of D.C & A.C Distribution Systems:D.C Distribution Systems:

ClassificationofDistributionSystems - ComparisonofDCvs.ACandUnder-Groundvs.Over - HeadDistributionSystems- RequirementsandDesignfeaturesofDistribution Systems- Voltage, Drop Calculations (Numerical Problems inD.CDistributorsforthefollowingcases:RadialD.C Distributorfedoneend and at the both the ends (equal/unequal voltages) and Ring Main Distributor.

A.C Distribution Systems:

Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to related load voltages.

UNIT-III:

AirInsulated&GasInsulated(GIS)Substations: Classificationofsubstations: - Indoor&Outdoorsubstations:Substationslayoutshowingthe 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, busbar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT-IV:

Power Factor & Voltage Control:

Causes of low power factor -Methods of Improving power factor -Phase advancing and generation of reactive KVAR using static Capacitors-Most economical power factor 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.

UNIT-V:

Economic Aspects of Power Generation & Tariff:

Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity,

utilization and plant use factors- Numerical Problems.

Tariff Methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. DesirableCharacteristicsofaTariffMethod-TariffMethods:FlatRate,Block- Rate,two-part,threepart,andpowerfactortariffmethodsandNumericalProblems. "

TEXT BOOKS:

1. PrinciplesofPowerSystemsbyV.KMehtaandRohitMehtaS.ChandCompany Pvt. Ltd, New Delhi2004.
2. Electrical Power Systems, PSR. Murty, BS Publications.
3. A course in Power Systems by J.B.Gupta S.K.Kataria & Sons-2016

REFERENCEBOOKS:

1. A Text book of Power system Engineering, R.K. Rajput,LaxmiPublications (P) Limited.
2. Electrical Power Generation,TransmissionandDistribution,S.N.Singh',PHI.
3. EledthcalPowerSystemsbyC.L.WadhawaNewAgeInternational (P) Liffiited,Publishers.
4. GenerationofElectricalEnergy,Dr.B.R.Gupta,S.Chand.

II Year B.Tech. EEE II-Sem

ELECTRICAL MACHINES –I LAB

L	T	P	C
0	0	3	2

Any 10 experiments out of 12

1. Magnetization characteristics of a DC shunt generator.
2. Load test on DC shunt generator.
4. Load test on DC compound generator.
5. Load test on DC series generator.
6. Brake test on DC shunt motor.
7. Brake test on DC compound motor.
8. Hopkinson's test on DC Shunt machines.
9. Field's test on DC Series machines.
10. Separation of losses in DC shunts motor.
11. Retardation test on DC shunt motor.
12. Speed control of DC shunt motor.
13. Swinburne's test on DC shunt machine.

ELECTRONIC DEVICES AND CIRCUITS LAB

L	T	P	C
0	0	3	2

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

Electronic Workshop Practice (In 3 Lab Sessions):

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
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.
3. Study and operation of
    a. Multimeters (Analog and Digital).
    b. Function Generator.
    c. Regulated Power Supplies.
    d. CRO.

PART B: Minimum of 10 experiments

1. Forward & Reverse Bias Characteristics of PN Junction Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Half Wave Rectifier with & without filters.
4. Full Wave Rectifier with & without filters.
5. Input & Output Characteristics of Transistor in CB Configuration and h-parameter calculations.
6. Input & Output Characteristics of Transistor in CE Configuration and h-parameter calculations.
7. FET characteristics.
8. Lissajous patterns using CRO.
9. Frequency Response of CC Amplifier.
10. Frequency Response of CE Amplifier.
11. Frequency Response of Common Source FET amplifier.
12. SCR characteristics.
13. UJT Characteristics.

INTELLECTUAL PROPERTY RIGHTS AND CYBER LAWS Second year B.Tech (Mandatory subject)

Course Objectives:

1. To make students familiar with Intellectual Property Rights.
2. To understand innovations in engineering and other domains.
3. To be familiar with patents, copyrights and various acts related to innovations.

UNIT - I:

Introduction to Intellectual property Rights (IPR):

Introduction, Types of Intellectual Property Rights, 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:

Copy rights Law:

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.

Patents Law:

Foundation of Patent Law, Patent Searching Process, Ownership Rights And Transfer

UNIT - IV:

Trade Secrets:

Trade Secrete Law, Determination of Trade Secrets Status, Liability For Misappropriations Of Trade Secrets, Protection For Submission, Trade Secret Litigation.

Unfair competition: Misappropriation Right of Publicity, False Advertising.

UNIT - V:

Cyber Law:

Cyber Crime, Information Security, Cyber Criminals, Classification of Cyber Criminals- Legal Perspectives- Indian Perspectives- Cyber Crimes And Indian ITA 2000, Global Perspective On Cyber Crime- Cyber Crime Era.

Course Outcomes:

Upon completion of the course, the students are expected to:

1. To define various terms related to Intellectual Property Rights.
2. To understand the process of patent, copyrights and related procedures.
3. To analyze the situation of IPR in the Indian context with that of global scenario.
4. To understand the patenting process through various case studies.

TEXT BOOKS & REFERENCES:

1. Deborah, E. Bo Choux, Intellectual Property Right, Cengage Learning
2. Prabuddha Ganguli, Intellectual Property Right - Unleashing the Knowledge Economy, Tata Mc Graw Hill Publishing Company Ltd.
3. Nina Godbole and Sunitha Belapure, "Cyber Security" Wiley India 2012.

PROFESSIONAL ETHICS, HUMAN VALUES AND SELF DEVELOPMENT

(MANDATORY COURSE)

L	T	P/D	C
2	0	0	0

Course Objectives:

a. To offer the students an appropriate set of values to live by
b. To help them achieve a balanced life with appropriate attitudes and behavior
c. To ensure harmonious life with sustained happiness and prosperity
d. To create awareness on Ethical human conduct, Engineering Ethics, Social responsibility as an engineer.

Course Outcomes:

1)Cultivate the habit of Introspection; Inspirations from within and outside and journal writing to become Successful Engineers with hopes of a better human being 2) Ethical Responsibilities of Engineers while - dealing with the issues.
3) To maintain work life –balance and societal well being
4) Develop Right thinking and understanding

UNIT – I

Course Introduction to Values: Need, Guidelines, Content and Educational Process, Application of values, Universal values. Natural Acceptance. Self Exploration – Meditation- self exploration. Continuous Happiness and Prosperity - Right thinking and understanding. Ambition and Aspiration.

UNIT - II:

Harmony in the Human Being:

Harmony in Myself! : Human being as a co-existence of 'I' and the material 'Body'. Needs of Self ('I') and 'Body'. The Body as an instrument of 'I' (I being the Doer, Seer and Enjoyer). Harmony of I with the Body, Correct Appraisal of Physical needs

UNIT - III:

Harmony in the Family, Society and in Nature:

Harmony in Human - Human Relationships: Harmony in the Family, Values in Human - Human Relationships,Trust, Respect and other Salient Values in Relationships. Harmony in the Society, Universal Harmony Order.

Harmony in the nature and Existence: Whole existence as Co-existence: Inter-connectedness and Mutual fulfillment among the four orders of nature - Recyclability and Self-regulation in nature.

UNIT - IV:

Professional Ethics:

Introduction, Profession, Professionals, Professionalism, Professional's- roles and risks, Professional Accountability, Ethics in Engineering Profession, Roles of Engineers, Balanced outlook on Law and Responsibilities as Citizens, Professional Responsibilities, Professional Rights.

UNIT - V:

Self Development:

Behavior and Attitude, Stress Management- Types of Stress, Self Management, Choices we make, Excellence.

Meditation: Importance of Meditation, Observation, Introspection, Contemplation, Concentration, Relaxation, Systematic Practice of Meditation.

Inner Cleaning, Need to purify our Conscience and develop Purity in Thoughts and Actions Journal Writing: Uses and Self Development.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, g p Bagaria, 2009, A foundation course in human values and p rofessional ethics.
2. Professional ethics by R Subramanian Oxford press
3. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd
4. Self development modules from heartfulness institute (content.heartfulness.org)
5. Prof. K Subba Raju 2013, Success secrets for engineering students , Smart student publication 3rd edition.

REFERENCE BOOKS:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.

PROFESSIONAL COMMUNICATION
(MANDATORY COURSE)

L	T	P	C
0	0	3	2

Introduction:

The world is in need of effective and efficient professionals. Technical students are to be equipped with Professional Communication skills to enable them to face the growing employment demands. The course has been introduced to bridge the gap between communication skills of ELCS and ACS.

Course Objectives:

- speak & write intelligible English
- understand professional etiquette and learn appropriate mannerism
- learn about leadership, team building skills and to solve problems by taking decisions
- to present effectively
- knowing his/her strengths and overcoming weaknesses

Course Outcomes:

A student learns:

- to speak and write appropriate English
- the professional demands
- to solve problems and take decisions
- requisite professional skills

Unit: I

Academic Vocabulary and Grammar

Exercises on: Correction of sentences Tenses,
Articles, Prepositions, etc.
Synonyms, Antonyms, One word substitutes, Idioms & Phrases

Unit: II

Self Appraisal

Self Introduction,
SWOT Analysis,
Goal setting
Personality Development

Unit: III

Professional Etiquette

Etiquette
Mannerism
Positive Attitude
Behavioural Traits

Unit: IV

Team Building

Leadership skills
Team Work
Decision Making/ Problem Solving / Conflict managements
Case Study

Unit: V

Presentation Skills

Poster Presentation
Oral Presentation

References:

1) Rao,M.S. *Soft Skills Enhancing Employability*. New Delhi: I.K.Publishing House,2010.
2) Rao, Nageshwar. *Communication Skills*. New Delhi: Himalaya Publishing House Pvt.Ltd, 2008
3) Ashrif Rizvi. *Effective TechnicalCommunication*, Tata Mc Grahill, 2011.
4) Daniel G. Riordan & Steven E. Pauley. *Technical Report Writing Today*, Biztantra Publishers, 2005.
5) David A McCurry & Joanne Buckely, *Handbook for Technical Writing* CENGAGE Learning 2008.
6) *Raymond Murphy's English Grammar* with CD, Murphy, Cambridge University Press, 2012.
7) William Standard. *Living English Structures*- Allen-Pearson, 2011.
8) S M Guptha. *Current English Grammar and Usage*, PHI, 2013.
9) Krishna Swami. *Modern English Grammar*-, McMillan, 2009.
10) Anjana Agarwal. *Powerful Vocabulary Builder*, New Age International Publishers, 2011

DISASTER MANAGEMENT
(MANDATORY COURSE)

L	T	P/D	C
2	0	0	0

Course Objectives:

- To provide knowledge related to the broad field of environmental risk assessment
- Steps involved in the risk assessment process, including statistical characterization of observed data
- Knowledge about tools that can be used in defining environmental risks, particularly as related to human health.
- To develop practical skills in disaster mitigation, planning, response and post disaster rehabilitation, particularly related to health and public health.

Course Outcomes:

- Develop an understanding of the key concepts, definitions a key perspectives of all Hazards Emergency Management
- Understand the Emergency/Disaster Management Cycle
- Have a basic understanding for the history of Emergency Management
- Develop a basic under understanding of Prevention, Mitigation, Preparedness, Response and Recovery
- Develop a basic understanding for the role of public and private partnerships

UNIT-I

Introduction to the Different Types Of Disasters:

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT-II

Environment and Disasters:

Environment, ecosystem and disasters. Climate change – issues and concerns. Industrial hazards and safety measures. Post disaster impact on environment. Impact of developmental projects on disaster risk. Aspects of environmental management for disaster risk reduction. Environmental Impact Assessment (EIA).

UNIT-III

Disaster Risk Mitigation:

Disaster risk assessment (Hazard-Vulnerability-Capacity analysis), Hazard mapping and forecasting. Principles and aspects of Disaster prevention Disaster mitigation Preparedness for damage mitigation and coping with disasters. Capacity building for disaster/damage mitigation (structural and non-structural measures). Contingency planning for damage mitigation of different hazards.

UNIT-IV

Disaster Management:
Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster responses; Police and other organizations.

UNIT-V

Planning For Disaster Rescue and Risk Reduction:
Community-hazard profile of the disaster site. DM cycle, Different phases of Disaster Management: Predisaster stage, Emergency stage, Post disaster stage. Implementation of different disaster management phase and Relief mechanism during different disaster stages including cyclones, earthquakes, fire accidents, Tsunami, landslides etc. Disaster Management Act (2005); Disaster Management Policy (2009).

TEXT BOOKS:

1. Disaster Mitigation: Experiences And Reflections by Pradeep Sahni, (2013)
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning (2009).

Part – D

Syllabi of

MANDETORY COURSES

INTELLECTUAL PROPERTY RIGHTS AND CYBER LAWS

Course Objectives:

4. To make students familiar with Intellectual Property Rights.
5. To understand innovations in engineering and other domains.
6. To be familiar with patents, copyrights and various acts related to innovations.

UNIT - I:

Introduction to Intellectual property Rights (IPR):

Introduction, Types of Intellectual Property Rights, 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:

Copy rights Law:

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.

Patents Law:

Foundation of Patent Law, Patent Searching Process, Ownership Rights and Transfer

UNIT - IV:

Trade Secrets:

Trade Secrete Law, Determination Of Trade Secrets Status, Liability For Misappropriations Of Trade Secrets, Protection For Submission, Trade Secret Litigation.

Unfair competition: Misappropriation Right Of Publicity, False Advertising.

UNIT - V:

Cyber Law:

Cyber Crime, Information Security, Cyber Criminals, Classification Of Cyber Criminals- Legal Perspectives- Indian Perspectives- Cyber Crimes And Indian ITA 2000, Global Perspective On Cyber Crime- Cyber Crime Era.

Course Outcomes:

Upon completion of the course, the students are expected to:

1. To define various terms related to Intellectual Property Rights.
2. To understand the process of patent, copyrights and related procedures.
3. To analyze the situation of IPR in the Indian context with that of global scenario.

14.To understand the patenting process through various case studies.

TEXT BOOKS & REFERENCES:

1. Deborah, E. Bo Choux, Intellectual Property Right, Cengage Learning.
2. Prabuddha Ganguli, Intellectual Property Right - Unleashing The Knowledge Economy, Tata Mc Graw Hill Publishing Company Ltd.,
3. Nina Godbole and Sunitha Belapure, "Cyber Security" Wiley India 2012.

PROFESSIONAL ETHICS, HUMAN VALUES AND SELF DEVELOPMENT

L	T	P/D	C
2	0	0	0

Course Objectives:

a. To offer the students an appropriate set of values to live by
b. To help them achieve a balanced life with appropriate attitudes and behaviour
c. To ensure harmonious life with sustained happiness and prosperity
d. To create awareness on Ethical human conduct, Engineering Ethics, Social responsibility as an engineer.

Course Outcomes:

1. Cultivate the habit of Introspection; Inspirations from within and outside and journal writing to become Successful Engineers with hopes of a better human being.
2. Ethical Responsibilities of Engineers while - dealing with the issues.
3. To maintain work life –balance and societal well being.
4. Develop Right thinking and understanding

UNIT – I

Course Introduction to Values: Need, Guidelines, Content and Educational Process, Application of values, Universal values. Natural Acceptance. Self Exploration – Meditation- self exploration. Continuous Happiness and Prosperity - Right thinking and understanding. Ambition and Aspiration.

UNIT - II:

Harmony in the Human Being:

Harmony in Myself: Human being as a co-existence of 'I' and the material 'Body'. Needs of Self ('I') and 'Body'. The Body as an instrument of 'I' (I being the Doer, Seer and Enjoyer). Harmony of I with the Body, Correct Appraisal of Physical needs

UNIT - III:

Harmony in the Family, Society and in Nature:

Harmony in Human - Human Relationships: Harmony in the Family, Values in Human - Human Relationships,Trust, Respect and other Salient Values in Relationships. Harmony in the Society, Universal Harmony Order.

Harmony in the nature and Existence: Whole existence as Co-existence: Inter-connectedness and Mutual fulfillment among the four orders of nature - Recyclability and Self-regulation in nature.

UNIT - IV:

Professional Ethics:

Introduction, Profession, Professionals, Professionalism, Professional's- roles and risks, Professional Accountability, Ethics in Engineering Profession, Roles of Engineers, Balanced outlook on Law and Responsibilities as Citizens, Professional Responsibilities, Professional Rights.

UNIT - V:

Self Development:

Behavior and Attitude, Stress Management- Types of Stress, Self Management, Choices we make, Excellence.

Meditation: Importance of Meditation, Observation, Introspection, Contemplation, Concentration, Relaxation, Systematic Practice of Meditation.

Inner Cleaning, Need to purify our Conscience and develop Purity in Thoughts and Actions Journal Writing: Uses and Self Development.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, g p Bagaria, 2009, a foundation course in human values and professional ethics.
2. Professional ethics by R Subramanian Oxford press
3. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
4. Self development modules from heartfulness institute (content.heartfulness.org).
5. Prof. K Subba Raju 2013, Success secrets for engineering students, Smart student publication 3rd edition.

REFERENCE BOOKS:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.

PROFESSIONAL COMMUNICATION

L	T	P	C
0	0	3	2

Introduction:

The world is in need of effective and efficient professionals. Technical students are to be equipped with Professional Communication skills to enable them to face the growing employment demands. The course has been introduced to bridge the gap between communication skills of ELCS and ACS.

Course Objectives:

To enable a student:

- speak & write intelligible English
- understand professional etiquette and learn appropriate mannerism
- learn about leadership, team building skills and to solve problems by taking decisions
- to present effectively
- knowing his/her strengths and overcoming weaknesses

Course Outcomes:

A student learns:

- to speak and write appropriate English
- the professional demands
- to solve problems and take decisions
- requisite professional skills

Unit: I

Academic Vocabulary and Grammar

Exercises on: Correction of sentences Tenses,
Articles, Prepositions, etc.
Synonyms, Antonyms, One word substitutes, Idioms & Phrases

Unit: II

Self Appraisal

Self Introduction,
SWOT Analysis,
Goal setting
Personality Development

Unit: III

Professional Etiquette

Etiquette
Mannerism

Positive Attitude
Behavioral Traits

Unit: IV

Team Building

Leadership skills
Team Work
Decision Making/ Problem Solving / Conflict managements
Case Study

Unit: V

Presentation Skills

Poster Presentation
Oral Presentation

References:

1. Rao,M.S. Soft Skills Enhancing Employability.New Delhi: I.K.Publishing House,2010.
2. Rao, Nageshwar. Communication Skills. New Delhi: Himalaya Publishing House Pvt. Ltd, 2008.
3. Ashrif Rizvi. Effective Technical Communication, Tata Mc Grahill, 2011.
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6. Raymond Murphy's English Grammar with CD, Murphy, Cambridge University Press, 2012.
7. William Standard. Living English Structures- Allen-Pearson, 2011.
8. S M Guptha. Current English Grammar and Usage, PHI, 2013.
9. Krishna Swami. Modern English Grammar-, McMillan, 2009.
10. Anjana Agarwal. Powerful Vocabulary Builder, New Age International Publishers, 2011.

DISASTER MANAGEMENT

L	T	P/D	C
2	0	0	0

Course Objectives:

- To provide knowledge related to the broad field of environmental risk assessment.
- Steps involved in the risk assessment process, including statistical characterization of observed data.
- Knowledge about tools that can be used in defining environmental risks, particularly as related to human health.
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Course Outcomes:

- Develop an understanding of the key concepts, definitions a key perspectives of all Hazards Emergency Management
- Understand the Emergency/Disaster Management Cycle
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UNIT-I

Introduction to the Different Types of Disasters:
Natural Disasters - Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.
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UNIT-II

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UNIT-III
Disaster Risk Mitigation:

Disasterrisk assessment (Hazard-Vulnerability-Capacity analysis), Hazard mapping and forecasting. Principles and aspects of Disaster prevention Disaster mitigation Preparedness for damage mitigation and coping with disasters. Capacity building for disaster/damage mitigation (structural and non-structural measures). Contingency planning for damage mitigation of different hazards.

UNIT-iV

Disaster Management:

Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster responses; Police and other organizations. (2009).

UNIT-V

Planning for Disaster Rescue and Risk Reduction:

Community-hazard profile of the disaster site. DM cycle, Different phases of Disaster Management: Predisaster stage, Emergency stage, Post disaster stage. Implementation of different disaster management phase and Relief mechanism during different disaster stages including cyclones, earthquakes, fire accidents, Tsunami, landslides etc. Disaster Management Act (2005); Disaster Management Policy (2009).

TEXT BOOKS:

1. Disaster Mitigation: Experiences and Reflections by Pradeep Sahni, (2013).
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning (2009).

B.TECH EEE III YEAR COURSE STRUCTURE

S. No.	Code	Subject	L	T/P	Credits
III Year I Semester					
1	A15017	Managerial Economics and Financial Accounts	3	1	3
2	A15212	Power Electronics	3	1	3
3	A15213	Power Systems-II	3	1	3
4	A15214	Electrical Machines-III	3	1	3
5	Open Elective-1	**A15218 -** Non Conventional Energy Sources **A15219 -** Energy Management	3	1	3
6	Professional Electives	**A15215** -High Voltage Engineering **A15216** - Advanced Control Systems **A15217**- Linear Systems Analysis	3	1	3
7	A15285	Electrical Machines Lab-II	0	2	2
8	A15286	Control Systems & Simulation Lab	0	2	2
9	MC-III	Personality Development & Behavioral Skills	2	0	2
		Total Credits	**20**	**10**	**24**
III Year II Semester					
1	A16421	IC Applications	3	1	3
2	A16221	Electrical Measurements & Measuring Instruments	3	1	3
3	A16222	Power Semiconductor Drives	3	1	3
4	A16223	Switchgear & Protection	3	1	3
5	Open Elective-2	**A16227 -** Energy Auditing & Conservation **A16228 -** Principles of Electric Power Utilization	3	1	3
6	Professional Electives	**A16224** - Renewable Energy Sources **A16225** - Reliability Engineering and Application to Power Systems **A16226** - Digital Control Systems	3	1	3
7	A16287	Power Electronics and Simulation Lab	0	2	2
8	A16090	Advanced Communication Skills Lab	0	2	2
9	MC-IV	Quantitative Methods & Logical Reasoning	2	0	2
		Total Credits	**20**	**10**	**24**

III Year B.Tech. EEE - I Sem

L	T/P/D	C
3	1/-/-	3

POWER ELECTRONICS

Objective:
With the advent of semiconductor devices, revolution is taking place in the power transmission distribution and utilization. This course introduces the basic concepts of power semiconductor devices, converters and choppers and their analysis.

UNIT - I
Power Semi-Conductor Devices:
Family of Thyristor – Silicon Controlled Rectifiers (SCR's) –Basic theory of operation of SCR – Static characteristics – Turn on and turn off methods- Dynamic characteristics of SCR - Turn on and Turn off times -Salient points. Two transistor analogy- BJT – Power MOSFET – Power IGBT and their characteristics and other thyristors .
Firing & Commutation Circuits:
SCR - UJT firing circuit —— Series and parallel connections of SCR's – Snubber circuit details – Specifications and Ratings of SCR's, BJT, IGBT - Numerical problems – Line Commutation and Forced Commutation circuits.

UNIT - II
AC-DC Converters 1-Phase Controlled Rectifiers:
Phase control technique – Single phase Line commutated converters – Midpoint and Bridge connections – Half controlled converters with Resistive, RL loads and RLE load– Derivation of average load voltage and current -Active and Reactive power inputs to the converters without and with Freewheeling Diode –Numerical problems. Fully controlled converters, Midpoint and Bridge connections with Resistive, RL loads and RLE load– Derivation of average load voltage and current – Line commutated inverters -Active and Reactive power inputs to the converters without and with Freewheeling Diode, Effect of source inductance – Derivation of load voltage and current – Numerical problems- Dual converters (single phase).
3-Phase Controlled Rectifiers:
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–Dual converters (three phase) - Waveforms –Numerical Problems.

UNIT - III
AC-AC Converters (AC Voltage Controllers) & Frequency Changers (Cyclo-Converters): AC voltage controllers – Single phase two SCR's in anti parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor wave forms – Firing circuits -Numerical problems - 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 only) – Waveforms.

UNIT - IV
DC-DC Converters (Choppers):
Choppers – Time ratio control and Current limit control strategies – Step down choppers Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage expression, Jones chopper, AC Chopper, Problems.

UNIT - V
DC-AC Converters (Inverters):
Inverters – Single phase inverter – Basic series inverter, parallel inverter - operation and waveforms - Three phase inverters (180, 120 degrees conduction modes of operation) - Voltage control techniques for inverters, Pulse width modulation techniques - Numerical problems.

TEXT BOOKS:

1. Power Electronics, Dr. P. S. Bimbhra, Khanna Publishers
2. Power Electronics Devices, Circuits and Industrial applications, V. R. Moorthi, Oxford University Press.

REFERENCE BOOKS:

1. Power Electronics; Circuits, Devices and Applications, M. H. Rashid, Prentice Hall of India.
2. Power Electronics, M. D. Singh & K. B. Kanchandhani, Tata Mc Graw - Hill Publishing Company.
3. Power Electronics, Vedam Subramanyam, New Age International (P) Limited, Publishers.
4. Elements of Power Electronics, Philip T. Krein, Oxford University Press.
5. Power Electronics, M. S. Jamil Asghar, PHI Private Limited.
6. Power Electronics, P. C. Sen, Tata Mc Graw-Hill Publishing.
7. Power Electronics, K. Hari Babu, Scitech Publications India Pvt. Ltd.
8. Principles of Power Electronics, John G. Kassakian, martin F. Schlect, Geroge C. Verghese, Pearson Education.

9. Thyristorised Power Controllers, G. K. Dubey, S. R. Doradra, A. joshi and R. M. K. Sinha, New Age International (P) Limited Publishers.

Outcomes:

After going through this course the student gets a thorough knowledge on construction operation V-I characteristics commutation firing and protection of various power semiconductor devices, focused analysis of thyristor device, nature of the R, RL and RLE loads for different power inputs, AC-to-DC power conversion through 1-phase & 3-phase controlled rectifiers, DC-to-DC power conversion through step-up and step-down choppers, AC-to-AC power conversion through AC voltage controllers, Frequency conversion through cyclo-converters, DC-to-AC power conversion through 1-phase & 3-phase inverters, different types of PWM (pulse-width modulation) techniques, steady-state and transient state analysis of all the power converters, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

III Year B.Tech. EEE I-Sem

L	T	P	C
3	1	0	3

POWER SYSTEMS-II - A15213

Objective:
This course is an extension of Power systems-I course. It deals with basic theory of transmission lines modeling and their performance analysis. Also this course gives emphasis on mechanical design of transmission lines, cables and insulators.

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 & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, 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 Short and Medium Length Transmission Lines:
Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

UNIT-III
Power System Transients & Factors Governing The Performance of Transmission Lines:
Types of System Transients - Travelling or Propagation of Surges - 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 (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).
Skin and Proximity effects - Description and effect on Resistance of Solid Conductors -Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

UNIT – IV
Overhead Line Insulators & Sag and Tension Calculations:
Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.
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.

UNIT – V
Underground Cables:
Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading, HV Cables.

TEXT BOOKS:

1. Electrical power systems - by C.L.Wadhwa, New Age International (P) Limited, Publishers.
2. Power System Engineering, I.J.Nagarath and D.P.Kothari, TMG.

REFERENCE BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
2. A Text Book of Power System Engineering, R. K. Rajput, Laxmi Publications (P) Limited.
3. Electrical Power Generation, Transmission and Distribution S. N. Singh, PHI.
4. Principles of Power Systems, V. K. Mehta and Rohit Mehta S. Chand Company Pvt. Ltd.
5. Electrical Power Systems, PSR, Murthy, BS Publications.
6. Power System Analysis and Design, Dr. B. R. Gupta, S. Chand & Company Limited.
7. Power System Analysis, Operation and control, Abhijit Chakrpabarti, Sunitha Halder, PHI, 3/e, 2010

8. Electrical Power Transmission system engineering Analysis and design by Turan Gonen, CRC Press (Taylor & Francis Group) Special Indian Edition, 2/e.

Outcome:

After going through this course the student gets a thorough knowledge on calculation of transmission line parameters, performance analysis of short medium long length transmission lines and factors affecting the performance analysis of transmission lines, transients in power systems, operation of different types of overhead line insulators, sag and tension calculation of transmission lines and detailed analysis of underground cables for power transmission and distribution, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

III EEE B.TECH I-SEM

L	C	T/P/D
4	3	1/-/-

ELECTRICAL MACHINES-III

Objective:
This subject is an extension of previous machines courses. It deals with the detailed analysis of Synchronous generators and motors which are the prime source of electrical power generation and its utilities. Also concerns about the different types of single phase motors which are having significant applications in house hold appliances and control systems.

UNIT – I
Synchronous Machine & Characteristics
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 EMF – suppression of harmonics –Excitation of Synchronous generators in thermal plants and Hydro plants-armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination – phasor diagram – load characteristics.

UNIT – II
Regulation of Synchronous Generator
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 Generator
Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactances.

UNIT – IV
Synchronous Motors
Synchronous Motors: Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed.

Power Circles: Excitation and power circles – hunting and its suppression – Methods of starting – synchronous Machines & induction motor.

UNIT – V
SPECIAL MACHINES
Principles of operation of Reluctance Motors, Stepper Motors, Universal Motors, Shaded Pole Motors, A.C. Series Motors, Permanent magnet Brushless DC Motors.

TEXT BOOKS:

1. Electrical Machines – by P.S. Bimbra, Khanna Publishers.
2. Electric Machines, I. J. Nagrath & D. P. Kothari, Tata Mc Graw Hill Publishers.
3. Performance and Design of AC Machines, MG. Say, BPB Publishers.

REFERENCE BOOKS:

1. Electro-machanics - III (Synchronous and single phase machines), S. Kamakashiah, Right Publishers.
2. Principles of Electrical Machines, V. K. Mehta, Rohit Mehta, S. Chand Publishing.
3. Theory of Alternating Current Machinery, Langsdorf, Tata McGraw-Hill Companies.
4. Electric machinery, A.E. Fitzerald, C. Kingsley and S. Umans, Mc Graw Hill Companies.
5. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
6. Fundamentals of Electric Machines, B. R. Gupta, Vandana Singhal, New Age International Publishers.
7. Electrical Machines, M. V. Deshpande, PHI Learning Private Limited.
8. Electrical Machines, R. K. Srivastava, Cengage Learning.
9. Brushless Permanent magnet and Reluctace Motor Drives, J.E. Miller, Calrendon Press Oxford, 1989.
10. Stepping Motors- A Guide to Motor Theory and practice,by P.P. Aearnley, Peter perengrinus, London,1982

Outcome:
After going through this course the student gets a thorough knowledge on, construction operation characteristics regulation parallel-operation power circles starting & speed control methods of synchronous machines and construction operation

characteristics of single-phase motors and special machines, with which he/she can able to apply the above conceptual things to real-world electrical and problems and applications.

III EEE B.TECH I-SEM

L	C	T/P/D
3	3	1/-/-

HIGH VOLTAGE ENGINEERING
(Professional Elective-I)

Objective:
This subject deals with the detailed analysis of breakdown occurring in gaseous, liquids and solid Dielectrics. Information about generation and measurement of High voltage and current. In addition High voltage testing methods are also discussed.

UNIT-I
Introduction to High Voltage Engineering
Electric Field Stresses, Gas/Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Surge voltages, their distribution and control, Gases as insulating media, collision process, ionization process.

UNIT-II
Break Down in Dielectric Materials
Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solids dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT-III
Generation & Measurement of High Voltages & 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 Direct Current voltages, measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse.

UNIT-IV
Over Voltages & Insulation Co-Ordination & DC measurements:
Natural causes for over voltages- Lighting 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, Measurements of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.

UNIT-V
Testing & Applications 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, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

TEXT BOOKS:

1. High Voltage Engineering, M.S. Naidu and V. Kamaraju, TMH Publications.
2. High Voltage Engineering, C.L. Wadhwa, New Age Internationals (P) Limited.

REFERENCE BOOKS:

1. High Voltage Engineering: Fundamentals, E.Kuffel, W.S. Zaengl, J.Kuffel by Elsevier.
2. High Voltage Insulation Engineering, Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited.
3. High Voltage Engineering, Theory and practice, Mazen Abdel Salam, Hussein Anis, Ahdan, Ahdan El- Morshedy, Roshdy Radwan, Marcel Dekker.

Outcome:
After going through this course the student gets a thorough knowledge on, basics of high voltage engineering , break-down phenomenon in different types of dielectrics, generation and measurement of high voltages and currents, the phenomenon of over voltages, concept of insulation coordination, testing of various materials and electrical apparatus used in high voltage engineering, with which he/she can able to apply the above conceptual things to real- world electrical and electronics problems and applications.

III EEE B.TECH I-SEM

L	T/P/D	C
3	1/-	3

ADVANCED CONTROL SYSTEMS
(Professional Elective-I)

Objective:

This subject deals with state space, describing function, phase plane and stability analysis including controllability and observability.

UNIT - I

State Space Analysis of Continuous time Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties, 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, Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement, Full order observer and reduced order observer.

UNIT - III

Describing Function Analysis: Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

UNIT - IV

Phase-Plane Analysis: Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

UNIT - V

Stability Analysis: Stability in the sense of Lyapunov, Lyapunov's stability and Lypunov's instability theorems. Direct method of Lypanov, generation of Lyapunov functions-Variable gradient method, Krasooviski's method.

TEXT BOOKS:

1. Advanced Control Systems, B. N. Sarkar, PHI Learning Private Limited.
2. Modern Control System Theory, M. Gopal, New Age International Publishers.

REFERENCE BOOKS:

1. Control systems, A.Ananad Kumar, PHI.
2. Control Systems Engineering, I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers.
3. Modern Control Engineering, Yaduvir Singh, S. Janardhanan, Cengage Learning.
4. Modern Control Engineering, K. Ogata, Prentice Hall of India, 3d edition.
4 Modern Control Engineering, D. Roy Choudhury, PHI Learning.
5. Modern Control Systems An introduction, S.M.Tripathi, Jones & Bartlett Publishers.

Outcomes:

After going through this course the student gets a thorough knowledge on, basics of advanced control systems, state space analysis of continuous time systems and concept of controllability and observability, non-linear systems, describing functions, phase-plane analysis, stability analysis through Lypanov stability, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

III Year B.Tech. EEE –I Sem

L T P C
3 1 0 3

LINEAR SYSTEMS ANALYSIS
(Professional Elective-I)

Objectives:
This subject gives basic knowledge of signals which is required by all the engineers. This course focuses on:

- To get an in-depth knowledge about signals, systems and analysis of the same using various transforms.

UNIT - I
Signal Analysis: Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT – II
Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, Typers of Sampling - Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT – III
Signal Transmission Through Linear Systems: Linear System, Impulse response, Response of a Linear System, Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI system, Filter characteristics of Linear Systems, Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and Rise time.

UNIT – IV
Convolution and Correlation of Signals: Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto Correlation of functions, Properties of Correlation function, Energy density spectrum, Parseval's Theorem, Power density spectrum, Relation between Auto Correlation function and Energy/Power spectral density function, Relation between Convolution and Correlation, Detection of periodic signals in the presence of Noise by Correlation, Extraction of signal from noise by filtering.

UNIT – V
Z–Transforms: Fundamental difference between Continuous and Discrete time signals, Discrete time signal representation using Complex exponential and Sinusoidal components, Periodicity of Discrete time signal using complex exponential signal, Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, 2 Ed., PHI.

REFERENCE BOOKS:

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2 Ed.
2. Signals and Signals – Iyer and K. Satya Prasad, Cengage Learning
3. Signals and Systems – A.Rama Krishna Rao – 2008, TMH.
4. Introduction to Signal and System Analysis – K.Gopalan 2009, Cengage Learning.
5. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH International Edition.
6. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, 3 Ed., 2004, PE.

Outcomes:
Upon completing this course the student will be able to:

- Represent any arbitrary signals in terms of complete sets of orthogonal functions and understands the principles of impulse functions, step function and signum function.
- Express periodic signals in terms of Fourier series and express the spectrum and express the arbitrary signal (discrete) as Fourier transform to draw the spectrum.
- Understands the principle of linear system, filter characteristics of a system and its bandwidth, the concepts of auto correlation and cross correlation and power Density Spectrum.

- Can design a system for sampling a signal.
- For a given system, response can be obtained using Laplace transform, properties and ROC of L.T.
- Study the continuous and discrete signal relation and relation between F.T., L.T. & Z.T, properties, ROC of Z Transform.

III Year B.Tech I Sem

L	T	P	C
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ELECTRICAL MACHINES LAB – II

Any Ten of the following experiments are required to be conducted.

1. O.C & S.C tests on single phase transformer.
2. Sumper's test on a pair of single phase transformer.
3. Brake test on three phase induction motor.
4. No-load & Blocked rotor tests on three phase induction motor.
5. Regulation of a three – phase alternate by synchronous impedance m.m.f methods.
6. V and inverted V curves of a three – phase synchronous motor.
7. Equivalent circuit of a single phase induction motor.
8. Determination of Xd and Xq of a salient pole synchronous machine.

In addition to the above eight experiments alteast any two of the following experiments are required to be conducted from the following list.

9. Regulation of three phase alternator by Z.P.F. and A.S.A methods
10. Scott connection of transformer and Parallel operation of single phase transformer.
11. Separation of core losses of a single phase transformer.
12. Load characteristics of three phase Induction Generator.

Reference books:

1. Electric machinery- P.S. Bimbra, Khanna Publishers, 7thedition, 2010.
2. Theory and Performance of Electrical Machines- JB. Gupta, S.K. Kataria and ISons, 2009.
3. Electro mechanics (transformers and induction motors) – S.Kamakshiah , Hitech publishers 2009.

III Year B.Tech. EEE I-Sem

L T P C
0 0 3 2

CONTROL SYSTEMS AND SIMULATION LAB

Any Ten of the following experiments are to be conducted

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor
4. Effect of feedback on DC servo motor
5. Transfer function of DC motor
6. Transfer function of DC Shunt generator
7. Characteristics of magnetic amplifiers
8. Characteristics of AC servo motor
9. PSPICE Simulation of Op-Amp based Integrator and Differentiator circuits.
10. Linear system analysis (Time domain analysis, Error analysis).
11. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system.
12. State space model for classical transfer function– Verification.

REFERENCE BOOKS

1. MATLAB and Tool books user's manual and- Math Works, USA.
2. PSPICE A/D Users Manual-Microsim,USA
3. PSPICE reference Guide –Microsim, USA.
4. Simulation of Electrical and Electronics Circuits Using P-Spice- By MH. Rashid, M/s PHI publications.

Part – C

Syllabi of

B.Tech., III Year II Semester

III Year B.Tech. EEE II-Sem

L	T	P	C
3	1	0	3

IC APPLICATIONS

UNIT - I:

Integrated Circuits: Classification, chip size and circuit complexity, Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT - II:

OP-AMP and Applications: Basic information of OP-AMP, ideal and practical OP-AMP, internal circuits, OP-AMP characteristics, DC and AC characteristics, 741 OP-AMP and its features, modes of operation-inverting, non-inverting, differential.

Basic application of OP-AMP, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Intergrators, Comparators, introduction to voltage regulators.

UNIT - III:

Active Filters & Oscillators: Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation - RC, Wien and quadrature type, waveform generators - triangular, sawtooth, square wave and VCO.

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.

UNIT - V:

D-A and A-D Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and slope ADC. DAC and ADC specifications.

TEXT BOOKS:

1. Linear Integrated Circuits, D. Roy Chowdhury, New Age International (p) Ltd.
2. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, PHI

REFERENCES BOOKS:

1. Operational Amplifiers & Linear Integrated Circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI.
2. Operational Amplifiers & Linear Intergrated Circuits: Theory & Applications, Denton J. Daibey, TMH.
3. Design with Operational Amplifiers & Analog Integrated Circuits, Sergio Franco, McGraw Hill.
4. Digital Fundamentals - Floyd and Jain, Pearson Education.

III Year B.Tech. EEE II-Sem

L	T	P	C
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ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS

Objectives:
Electrical Measurements & Measuring Instrumentscourse introduces the basic principles of all measuring instruments. It also deals with the measurement of RLC parameters, voltage, current, power factor, power, energy, frequency and magnetic measurements. It also introduces transducers and oscilloscopes- CRO.

UNIT-I
Introduction to Measuring Instruments:
Classification-deflection, control and damping torques- Ammeters and Voltmeters- PMMC, moving iron type instruments- expression for the deflecting torque and control torque- Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters- electrometer type and attracted disc type, Extension of range of Electrostatic Voltmeters.

UNIT-II
Potentiometers & Instrument Transformers
Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types, standardization- applications. CT and PT- Ratio and Phase angle errors.

UNIT-III
Measurement of Power & Energy:
Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of reactive power.

Single phase Induction type energy meter–driving and braking torques-errors and compensations – testing by phantom loading using RSS meter. Three phase energy meter- Maximum demand meters.

UNIT – IV
D.C & A.C Bridges:
Method of measuring low, medium, high resistances – sensitivity of wheat- stone Bridge – carey foster's Bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistacne – loss of charge method. Measurement of Inductance – Factor – Maxwell's Bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle – Desauty Bridge. Wien's Bridge – Schering Bridge.

UNIT – V
Transducers & oscilloscopes:
Definition of transducers, classification of transducers, Advantages of Electrical transducers, characteristics and choice of transducers; Principle operation of LVDT and capacitor transducers, LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, photo diodes.
CRO: Cathode ray oscilloscope – cathode ray tube – time base generator- horizontal and vertical amplifiers, CRO Probes, Applications of CRO, Measurement of Phase and Frequency-Lissajous patterns.

TEXT BOOKS:
1. Electrical & electronic measurement & Instruments, A.K.Swehney, Dhanpat Rai & Co . Publications.
2. Electrical measuring instruments and measurements, S.C. Bhargava, BS Publications.

REFERENCE BOOKS:
1. Electrical and electronic measurements and instrumentation, R.K.Rajput, S.Chand & company Ltd.
2. Electrical and electronic measurements, G.K.Banerjee, PHI Learning Pvt.Ltd.

Outcome:
Understanding - basic construction of all the Analog measuring instruments, Extension of range of all measuring instruments. Application of these concepts in measuring electrical quantities like voltage, current, power and energy.Analysis & Design of instrument transformers. Explain the principles - D.C and A.C potentiometer, methods of standardization & solution to problems. Explain DC and AC Bridges & apply basic bridge principles to measure the electrical parameters R,L,C,f. Basic principle, classification, advantages & applications of transducers, applications of CRO.

III Year B.Tech. EEE II-Sem

L	T	P	C
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POWER SEMICONDUCTOR DRIVES

Objective:
This course is an extension of Power Electronics applications to AC and DC drives. Control of DC motor drives with single phase and three phase Converters and choppers are given in detail. The control of AC motor drives with variable frequency conveners and variable voltage are presented.

UNIT –I
Control of DC Motors through Phase Controlled Rectifiers:
Introduction to Thyristor controlled Drives, Single Phase semi and fully controlled converters connected to DC separately excited and DC series motors -continuous current operation - output voltage and current waveforms- Speed and Torque expressions - Speed - Torque Characteristics- Problems on Converter fed DC motors. Three phase semi and fully controlled converters Connected to DC separately excited and DC series motors - output voltage and current waveforms - Speed and Torque expressions - Speed - Torque characteristics - Problems.

UNIT – II
Four Quadrant Operations of DC Drives through Dual Converters:
Introduction to Four quadrant operation - Motoring operations, Electric Braking - Plugging, Dynamic and Regenerative Braking operations, Four quadrant operation of D C motors by dual converters -Closed loop operation of DC motor (Block Diagram Only).

UNIT III
Control of DC Motors by Choppers (1-. 2-, 4- Quadrant Operations):
Single quadrant, Two -quadrant and four quadrant chopper fed separately excited and series exacted motors - Continuous current operation - Output voltage and current wave forms - Speed torque expressions - speed torque characteristics - Problems on Chopper fed DC Motors - Closed Loop operation (Block Diagram Only).

UNIT –IV
Control of Induction Motors:
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 delves (Block Diagram Only).
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 & self control of synchronous motors - Operation of self controlled synchronous motors by VSI and CSI 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, VFI, CSI.

TEXT BOOKS:
1. Power Semiconductor Drives, PV Rao, BS Publications.
2. Fundamentals of Electric Drives, G K Dubey Narosa Publications

REFERENCE BOOKS:

1. Power Semiconductor Drives, S. B. Dewan, G R. Slemon , A. Straughen. Wiley Pvt Ltd.
2. Electric Drives N K. De, P. K. Sen, PHI Learning Private Ltd.
3. Thyristor Control of Electric drives, Vedam Subramanyam Tata McGraw Hill Pubications
4. Electrical machines and Drive Systems, John Hindmarsh, Alasdair Renfrew, Newnes.
5. Electric Motors and Drives, Fundamentals, Types and Applications Austin Hughes, Newnes.
6. Power Electronics and Variable Frequency Drives Technology and Applications, Bimal K. Bose, Wiley India Pvt, Ltd.
7. A First course on Electrical Drives, S K Pillai, New Age International (P) Ltd.
8. Modern Power Electronics and AC Drives, B.K.Bose, PHI.
9. Power Electronic Circuits, Devices and applications, M,H.Rashid, PHI

Outcome:

After going through this course the student gets a Thorough knowledge on, steady-state analysis control speed-torque characteristics and closed-loop operation of DC motors (separately excited shunt motor and series motor) through phase controlled rectifiers and choppers, single-quadrant two-quadrant and four-quadrant operations forward-motoring forward-braking reverse-motoring reverse-regenerative braking operations of DC motors.

III Year B.Tech. EEE II-Sem

L	T	P	C
3	1	0	3

SWITCH GEAR AND PROTECTION

Objective:
This course introduces all varieties of circuit breakers and relays for protection of generators, transformers feeders and bus bars from different faults with emphasis on neutral grounding.

UNIT–I
Circuit Breakers:
Circuit Breaker (CB) – Elementary principles of arc interruption, Recovery– Restriking Voltage and Recovery voltages–Restriking phenomenon–Average and Max. RRRV–Numerical problems-Current chopping and Resistance switching–CB ratings and specifications: Auto reclosing. Description and operation of following types Circuit Breaker: Minimum Oil Circuit Breaker, Air Blast Circuit Breaker–Vacuum and SF6 circuit breakers and their applications.

UNIT–II
Electromagnetic, Static Relays & Numerical Relays:
Principle of operation and construction of attracted armature– Balanced beam– induction disc and induction cup relays– Relays classification– Instantaneous– DMT and IDMT types– Applications of relays: Over current/under voltage relays– Directional relays– Differential relays and percentage differential relays
Distance relays:
Impedance– Reactance– Mho and offset mho relays– Characteristics of distance relays, Static Relays and Numerical Relays, Comparison of numerical relays & static relays with electromagnetic relays.

UNIT–III
Generator & Transformer Protection:
Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection– Numerical examples on percentage windings unprotected.Protection of transformers: Percentage differential protection– Numerical problems on Design of CT's ratio– Buchholz relay protection.

UNIT–IV
Feeder and Bus bar Protection& Grounding Protection of Lines:
Over current– earth fault, Carrier current and three zone distance relay using impedance relays Protection of bus bars– Differential protection.

Neutral grounding:
Grounded & ungrounded neutral systems.-Effects of ungrounded neutral on system performance. Methods of neutral grounding: Solid resistance, reactance-Arcing grounds. Earthing practices in Substations.

UNIT–V:
Protection against over voltage and grounding:
Generation of over voltages in power systems– Protection against lightning over voltages– Valve type and zinc–Oxide lighting arresters– Insulation coordination– BIL– impulse ratio–. Earthing Practices in Substations.

TEXT BOOKS:

1. Power system protection and switch gear by BadriRam, Viswakarma TMH publications
2. Switchgear & protection, Sunil Rao, Khanna publishers.
3. Protection & switchgear, Bhavesh Bhalja, R.P Mahesheari, Nilesh G.Chothani, and Oxford University press.

REFERENCE BOOKS:

1. Electrical power systems, C.L Wadhwa, New age international (P) limited, Publishers.
2. Electrical Power System Protection by C. CHRISTOPOULOS and A. Wright, Springer publications.
3. Electrical power systems, P.S.R Murthy, BS Publications.
4. Power System Protection& switchgear by Bhuvanesh Oza, TMH.
5. A textbook on power system engineering, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanapat Rai & Co pvt.ltd.
6. A textbook on power system engineering, R.K Rajput, Laxmi Publications (P) ltd.
7. Principle of power system, V.K Mehta& Rohit Mehta, S.Chand company pvt ltd.
8. Digital and numerical relays by T.S Madhavarao Tata Magra hills
9. Technical Reference Book, Vol. 1, APTRANSCO

Outcomes:

After going through this course the students gets a thorough knowledge on various types of circuit breakers and relays used for protection of generators, transformers, feeders, bus-bars etc., they understand the applications of relays, neutral grounding, lightening arrestors, and numerical relays in the power systems.

III Year B.Tech. EEE II-Sem

L	T	P	C
3	1	0	3

RENEWABLE ENERGY SOURCES
(Professional Elective-II)

Objectives:
It introduces solar energy its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, geothermal energy and ocean energy as alternative 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, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II
Solar Energy Collection, Storage & Applications:
Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Storage & Applications:
Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III
Wind Energy:
Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria. Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Blo-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-IV
Geothermal Energy:
Resources, types of wells, methods of harnessing the energy, potential in India.
Ocean Energy:
OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and Conversion techniques, mini-hydel power plants, and their economics.

UNIT-V
Miscellaneous energy conversion systems:
Coal gasification and liquefaction, thermo electric energy conversion-Thomson effect, peltier effect and see beck effect.Types of fuel cells, H2-O2 Fuel cells, Application of fuel cells,Environmental effects of energy conversion systems, pollution from coal and preventive measures, steam stations and pollution

TEXT BOOKS
1. Non-Conventional Energy Sources, G.D. Rai, Khanna Publishers.
2. "Energy conversion systems" by Rakosh das Begamudre, New age International publishers, New Delhi - 2000.
3. Introduction to renewable energy, Vaughn Nelson, CRC Press (Taylor & Francis).

REFERENCE BOOKS
1. Renewable Energy Resources, Twidell & Wier, CRC Press (Taylor & Francis).
2. Renewable Energy Sources and Emerging Technologies, D. P. Kothari, K. C. Singal, Rakesh Ranjan, PHI Learning Private Limited.
3. Fundamentals of Renewable Energy Systems, D. Mukherjee, S. Chakrabarti, New Age International.
4. Renewable Energy Power for a sustainable Future, Godfrey Boyle, Oxford University Press.
5. Renewable energy resources, Tiwari and Ghosal, Narosa publications.
6. Renewable Energy Technologies, Ramesh & Kumar, Narosa publications.
7. Non-Conventional Energy Systems, K Mittal, Wheeler publications.

Outcomes:
After going through this course the student gets a thorough knowledge on,various types of renewable energy sources i.e. solar, wind, bio-mass, geothermal, ocean, hybrid energy systems and principles of direct energy conversion, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

L T P C
3 1 0 3

RELIABILITY ENGINEERING AND APPLICATIONS TO POWER SYSTEMS
(Professional Elective-II)

Objective:
This subject introduces the concept of probability, reliability, distribution functions and various methods and techniques to calculate and estimate the reliability of different engineering problems and models.

UNIT - I
Basics of Probability theory & Distribution & Network Modeling and Reliability Analysis:
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.
Analysis of Series, Parallel, Series-Parallel networks – complex networks – decomposition method.

UNIT – II
Reliability functions & Markov Modeling:
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.
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.

UNIT – III
Frequency & Duration Techniques & Generation System Reliability Analysis:
Frequency and duration concept – Evaluation of frequency of encountering state, mean cycle time, for one , two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering of merged states.
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 - IV
Composite Systems Reliability Analysis:
Decompositions method – Reliability Indices – Weather Effects on Transmission Lines.

UNIT – V
Distribution System and Reliability Analysis:
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.
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.

Outcome:
After going through this course the student gets a thorough knowledge on, basic probability theory, distribution functions, reliability analysis of various models through different methods, reliability functions, repairable inseparable systems reliability through markov modeling frequency and duration techniques, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

III Year B.Tech. EEE II-Sem

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DIGITAL CONTROL SYSTEMS
(Professional Elective-II)

Objective:
This course gives fundamentals digital control systems, Z- transforms, state space representation of the control systems, concepts of controllability and obervability, estimation of stability in different domains, designof discrete time control systems, compensators, state feedback controllers, state observers through various transformations.

UNIT – I
Introduction:
Block Diagram of typical control system- advantages of sampling in control systems – examples of discrete data and digital systems – data conversion and quantization – sample and hold devices – D/A and A/D conversion – sampling theorem – reconstruction of sampled signals –ZOH. Z-transform: Definition and evaluation of Z-transforms – mapping between s-plane and z-plane – inverse z-plane transform – theorems of the Z-transforms –limitations of z-transforms –pulse transfer function –pulse transfer function of ZOH –relation between G(s) and G(z) – signal flow graph method applied to digital systems.

UNIT- II
State Space Analysis:
State space modeling of digital systems with sample and hold – state transition equation of digital time in variant systems – solution of time in variant discrete state equations by the Z-Transformation – transfer function from the state model – Eigen values – Eigen vector and diagonalisation of the A-matrix – Jordan canonical form. Computation of state transition matrix-Transformation to phase to variable canonical form-The state diagram – decomposition of digital system – Response of sample data system between sampling instants using state approach. Stability: Definition of stability – stability tests – The second method of Liapunov.

UNIT- III
Time Domain Analysis:
Comparison of time response of continuous data and digital control systems-correlation between time response and root locus j the s-plane and z-plane – effect of pole-zero configuration in the z-plane upon the maximum overshoot and peak time of transient response – Root loci for digital control systems – steady state error analysis of digital control systems – Nyquits plot – Bode plot-G.M and P.M.

UNIT- IV
Controller Design:
The digital control design with digital controller with bilinear transformation – Digital PID controller-Design with deadbeat response-Pole placement through state feedback-Design of full order state observer-Discrete Euler Lagrance Equation – Discrete maximum principle.

UNIT-V
Digital State Observer:
Design of - Full order and reduced order observers. Design by max. Principle: Discrete Euler language equation-discrete maximum principle.

TEXT BOOKS:

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition.
2. Digital Control Systems, V. I. George, C. P. Kurian, Cengage Learning.
3. Digital Control and State Variable Methods by M.Gopal, TMH. 4. Digital Control Engineering, M.Gopal

REFERENCE BOOKS:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control Engineering Analysis and Design M. Sami Fadali Antonio Visioli, AP Acad

Outcome:
After going through this course the student gets a thorough knowledge on, basics of digital control systems, Z-transforms, mapping between S-plane and Z- plane, state- space analysis, concept of controllability and obervability, derivation of pulse-transfer function, stability analysis in S-domain and Z-domains, stability through jury-stability test, stability through bilinear transformation and R-H criteria, design of discrete-time control systems, design of lag, lead, lead-lag compensators, design of PID controllers and design of state feedback controllers and observers, with which he./she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

POWER ELECTRONICS AND SIMULATION LAB

Any ten of the following experiments are required to be conducted.

1. Study of the characteristics of SCR, MOSFET &IGBT.
2. Gate Firing Circuits for SCRs (R- Triggering, RC Triggering & UJT Triggering).
3. Single Phase AC voltage Controller with R & RL Loads.
4. Single Phase fully Controlled Bridge Converter with R& RL Loads.
5. DC Jones Chopper with R& RL Loads.
6. Single Phase Parallel Inverter with R& RL Loads.
7. Single Phase Cyclo-Converter with R& RL Loads.
8. Single Phase Series Inverter with R& RL Loads.
9. Single Phase Half controlled converter with R Load.
10. PSPICE simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.
11. PSPICE simulation of resonant pulse commutation circuit and Buck Chopper.
12. PSPICE simulation of single phase Inverter with PWM control.

REFERENCE BOOKS:

1. Simulation of Electrical and Electronics Circuits Using PSPICE- by M.H. Rashid, M/s PHI publications.
2. PSPICE A/D Users Manual-Microsim, USA
3. PSPICE reference Guide –Mircosim, USA
4. MATLAB and Tool books user's manual and- MATH Works, USA

Part – D

OPEN ELECTIVES

&

GENERAL SUBJECTS

OPEN ELECTIVES

Introduction

The B.Tech course structure under CBCS consists of 4 Professional Electives and 3 open electives. Each professional elective offered by the students own department gives a choice of three to four courses out of which the student is to select one course. Similarly under open elective system, the student is offered one course each in 3 semesters viz., 3/1, 3/2 & 4/1 with 3 credits.

The six engg. and along with MBA depts. of the college have been divided into four groups
Group- I - ECE & EEE
Group –II - CSE & IT
Group –III - Mechanical & Civil
Group –IV- MBA
Under CBCS, a student from a particular group cannot opt the courses offered by that particular group.

Details of the Courses offered by different Groups -1
Courses offered by Group -1 Departments

ECE
III Year – I Semester
1. Introduction to Microcontrollers & Applications
2. Basic Electronics & Instrumentation
III Year – II Semester
1. Fundamentals of Embedded Systems
2. Principles of Communications

EEE
III Year – I Semester
1. Non Conventional Energy Sources
2. Energy Management
III Year – II Semester
1. Principles of Electrical Power Utilization
2. Energy Auditing &Conservation

Courses offered by Group-2 Departments
CSE/IT
III Year – I Semester
1. Java Programming
2. Operating Systems
III Year – II Semester
1. Database Management Systems
2. Software Engineering

Courses offered by Group-3 Departments
MECH
I Semester
1. Elements of Mechanical Engineering
2. Industrial Engineering
II Semester
1. Basic Automobile Engineering
2. Material Science and Engineering

CIVIL
I Semester
1. Remote Sensing and GIS

2. Smart City

II Semester

1. Green Building
2. Environmental Pollution and Control Methods

Courses offered by Group-4 Department

MBA

I Semester

Total engineering Quality Management

II Semester

Basics of Banking and Capital Market

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

PRE REQUISITES:

- Probability and statistics
- Operation research
- Mathematics-I
- Environmental studies

Course Objectives: To enable the student to understand, with a practical insight,

- The importance of certain basic issues governing the business operations namely demand and supply, production function, cost analysis,
- analysis of markets, forms of business organizations,
- Significance of capital budgeting and financial accounting and financial analysis.

UNIT –I:

Introduction to Managerial Economics& Demand Analysis:

Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT –II:

Production & Cost Analysis:

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts (Opportunity cost vs outlay costs, Fixed, variable and semi variable costs, marginal cost vs average cost, out of pocket vs book cost, imputed cost, implicit & explicit cost, incremental and decremental cost, sunk vs future cost, separable and joint costs) Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

UNIT –III:

Markets & New Economic Environment:

Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing. Methods of Pricing. Business: Features and evaluation of different forms of Business Organization: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment: Changing Business Environment in Post-liberalization scenario.

UNIT-IV: Introduction to Financial Accounting & Financial Analysis:

Accounting concepts and Conventions Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).Financial Analysis: Analysis and Interpretation of Liquidity Ratios (current ratio, quick ratio), Activity Ratios(inventory turnover ratio, debtors turnover ratio), and Capital structure Ratios(debt equity ratio, interest coverage ratio) and Profitability ratios(gross profit ratio, net profit ratio, operating profit ratio, P/E ratio, EPS). Du Pont Chart.

UNIT –V: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital, Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), Net Present Value Method (simple problems), IRR and PI method.

Outcomes: At the end of the course the students is expected

- To understand and enhance the knowledge regarding managerial economics concepts and obtaining optimal solutions.
- To get an idea of analysis of firm's financial position with the techniques of financial analysis and ratio analysis.

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
2. Vijay Kumar & Appa Rao, Managerial Economics & Financial Analysis, Cengage 2011.
3. J.V.Prabhakar Rao & P.V.Rao, Managerial Economics & Financial Analysis, Maruthi Publishers, 2011.

REFERENCE BOOKS:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.2012.

2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey & Chrystel, Economics, Oxford University Press, 2012
4. Domnick Salvatore: Managerial Economics in a Global Economy, Thomson, 2012.
5. Narayanaswamy: Financial Accounting—A Managerial Perspective, Pearson, 2012.
6. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2012.
7. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2012.
8. Dwivedi: Managerial Economics, Vikas, 2012.
9. Kasi Reddy, Saraswathi, MEFA, PHI Learning, 2012.
10. Shailaja & Usha : MEFA, University Press, 2012.

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ADVANCED COMMUNICATION SKILLS (ACS) LAB
(Common to all branches)

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.

Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educational English speakers and respond appropriately in different socio-cultural and professional contexts.

Syllabus:

The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) lab:

1. **Activities on Fundamentals of inter-personal Communication and Building Vocabulary –** Starting a conversation – responding appropriately and relevantly – using the right body language - Role Play in different situations & Discourse Skills – using visuals – Synonyms and antonyms, word roots, one word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension –** General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.
3. **Activities on Writing Skills –** Structure and presentation of different types of writing – letter writing/ Resume writing/ e-correspondence/ Technical report writing / Portfolio writing – planning for writing – improving one's writing.
4. **Activities on Presentation Skills –** Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/e-mails/assignments etc.
5. **Activities on Group Discussion and interview Skills –** Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation. Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video – conference and Mock Interviews.

Books Recommended:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University 2009.
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D. Pearson Education 2011.
3. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
4. Business and Professional Communication: Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
5. The Basics of Communication: A Relational Perspective. Steve Duck & David T. Mc Mahan. Sage South Asia Edition. Sage Publications. 2012.
6. English Vocabulary in Use series, Cambridge University Press. 2009
7. Management Shapers Series by Universities Press (India) Pvt. Ltd. Himayatnagar, Hyderabad. 2008.
8. Handbook for Technical Communication by David A. McMurrey & Joanna Buckley. 2012. Cengage Learning.
9. Communication Skills by Leena Sen.PHI Learning Pvt. Ltd. New Delhi. 2009.
10. Handbook for Technical Writing by David A McMurrey & Joanna Buckley Cengage Learning. 2008.
11. Job Hunting by Colm Downess, Cambridge University Press 2008.
12. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
13. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill. 2009.
14. Books on TOEFL/GRE/GMAT/ICAT/IELTS by Barron's/DELTA/Cambridge University Press.
15. International English for Call Centres by Barry Tomalin and Suhashini Thomas Macmillan Publishers. 2009.

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PERSONALITY DEVELOPMENT AND BEHAVIOURAL SKILLS

Course Objectives

- To enable students to communicate with outside and peer group members in an effective manner.
- To enable the students to give better presentation and explanation on their projects, posters and assignments - this makes them industry ready.
- To perform better during Campus Recruitment and various interviews they face in their career.

Course Outcomes

At the end of the course a student is expected:

- To communicate with more confidence using better spoken and written English
- To give better presentation and explanation with the use of digital inventions
- To perform well during Campus Drives and different Interviews

Course Outcomes

Unit – I

Personality Development: Definition - Various Aspects of Personality Development - Behavioural Traits. Importance of Soft skills-Soft skills for a future Entrepreneur - Qualities of a good leader - Stress Management - Success stories.

Unit – II

Non Verbal Communication: Kinesics Haptics Proxemics Vocalics Oculesics Body Language in Interviews.

Unit - III

Team Dynamics: Different Types of Teams-role of an individual - Communicating as a group or team leader - Individual Presentations/Team Presentation. Case Studies: Project Presentations.

UNIT-IV

Technical Report Writing: Formats - Effective Resume Preparation - Covering Letter - Statement of Purpose (SoP).

UNIT-V

Role of Multimedia in Communication: Communication in a Digital Edge (Video Conference Etc.)

E-Correspondence: Recent Trends in Professional Communication - Social Networking: Importance, Effects.

Blogging: Creating of Blogs - Technical and Non – technical blogs – Success Stories and Case Studies.

Reference Books

1. Barun, K Mitra, Personality Development and Soft Skills, Oxford University Press, 2nd Edition, 2016.
2. Gopalaswamy Ramesh, the Ace of Soft Skills: Attitude, Communication and Etiquette for Success, Pearson Education, 2013.
3. Krishna Mohan & Meera Banerji, Developing Communication Skills, Macmillan India Ltd, 2008.
4. Krishna Mohan & Meenakshi Raman, Effective English Communication, Tata McGraw-Hill Publishing Company Ltd, 2008.
5. Arati Gurav, 50 Mantra's of Personality Development, Buzzingstock Publishing House, 2013.
6. P. Kiranmai Dutt & Geetha Rajeevan, Basic Communication Skills, Cambridge University Pvt. Ltd2007.
7. S.C. Sood, Mita Bose, Naresh Jain, Developing Language Skills, Manohar Publications, 2007, T.M. Farhathullah, Communication Skills for Technical Students, Orient Longman Pvt Ltd, 2002.

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QUANTITATIVE METHODS & LOGICAL REASONING

Course Objectives:

1. The objective of this course is to enhance the problem solving skills in the areas of **'Quantitative Aptitude'** and **'Reasoning'** which will enable the students to better preparation for **Campus Placements** and competitive examinations.
2. To improve the logical thinking and mathematical ability of the students.

Course Outcomes:

At the end of the completion of the course a student is expected

1. To solve basic and complex mathematical problems in short time.
2. To perform well in various competitive exams and placement drives.

Quantitative Aptitude and Reasoning:

Unit – I

1. Number System:
Speed math's, Numbers, Factors, prime & Co primes, LCM & HCF, Divisibility rules, finding unit place digit and last two digits of an expression

2. Simple Equations:
Definition of Linear equation, word problems

3. Ratio, Proportion and Variations:
Definition of ratio, ratio of Proportion, Comparison of ratios, Compound ratio, Direct and indirect proportion

4. Percentages:
Converting fractions and decimal into percentages, successive percentage, populations, expenditure and savings

5. Profit and loss:
Relation between Cost price and selling price, Discount and Marked price, Gain or Loss percentages on selling price

6. Simple and Compound Interest:
Problems on interest (**I**), amount (**A**), Principal (**P**) and rate of interest(**R**)
Difference between the simple interest and compound interest for 2 and 3 years.

Unit-II

1.Partnership:
Relation between partners, period of investment and shares

2. Averages and Ages:
Average of different groups, change in averages by Adding, deleting and Replacement of objects, problems on ages.

3. Allegation and mixtures:
Allegation rule, Mean value of the mixture, Replacement of equal amount of quantity.

Time and Work:
Men and Days, Work and Wages, pipes and cisterns, hours and work, Alternate day's concept,

Time and Distance:
Difference between the average and Relative speeds, reaching the destination late and early, Stoppage time per hour, time and distance between two moving bodies

Trains, Boats and Streams:
Train crossing man, same and opposite directions, Speed of boat and stream,

Unit-III

1. Progressions:
Arithmetic, Geometric and Harmonic Progressions, Arithmetic Mean, Geometric Mean and Harmonic Mean and their relations.

2. Quadratic Equations:
General form of Quadratic equation, finding the roots of Quadratic equation, Nature of the Roots.

3. Mensurations:
2D geometry- perimeter, areas, 3D geometry - surface areas, volumes

4. Permutation and Combination:
Fundamental rules, problems on permutations & combinations.

5. Probability
Definition of probability, notations and formulae, problems on probability.

6. Data Interpretation and Data Sufficiency:
Tabular and Pie-charts, Bar and Line graphs, Introduction to data sufficiency, problems on data sufficiency.

Unit-IV
1. Deductions:
Statements and conclusions using Venn diagram and Syllogism method

2. Connectives:
Definition of simple and compound statements, Implications and negations for compound statements.

3. Series completion:
Number series, Alphabet series, letter series.

4. Coding and Decoding:
Letter coding, Number coding, Number to letter coding, Matrix coding, Substitution, Mixed letter coding, Mixed number coding, Deciphering individual letter codes by analysis.

5. Analytical Reasoning Puzzles:
Problems on Linear, Double line-up and Circular arrangements, Selections and Comparisons.

6. Blood Relations:
Defining the various relations among the members of a family, Solving Blood Relation Puzzles by using symbols and notations. Problems on Coded relations.

Unit-V
1. Direction sense test:
Sort of directions in puzzles distance between two points, problems on shadows, Application of triangular triplets.

2. Clocks:
Relation between minute-hour hands, angle vs time, exceptional cases in clocks

3. Calendars:
Definition of a Leap Year, Finding the Odd days, Finding the day of any random calendar date, repetition of calendar years.

4. Cubes and Dices:
Finding the minimum and maximum number of identical pieces and cuts, painting of cubes and cuts, problems on dice.

5. Venn diagrams:
Circular representation of given words, Geometrical representation of certain class, set theory based problems.

6. Number, Ranking and Time sequence test:
Number test, Ranking test, Time sequence test.

Text Books:
1. GL Barrons, Mc Graw Hills, Thorpe's verbal reasoning, LSAT Material
2. R S Agarwal, S.chand, 'A modern approach to logical reasoning'
3. R S Agarwal, S.Chand, 'Quantitative Aptitude'

Reference Books:
1. Quantitative Aptitude-G.L BARRONS
2. Quantitative Aptitude-Abhijit Guha Mc Graw Hills.
3. Quantitative Aptitude-U.Mohan Rao SCITECH.

COURSE STRUCTURE

B.Tech EEE IV Year I Semester

Course Code	Subject	Lectures	T/P	Credits
A17441	Microprocessors and Interfacing Devices	3	1	3
A17230	Power Systems Operation & Control	3	1	3
A17231	Computer Methods In Power Systems	3	1	3
A17232 A17233 A17234	1.Optimization Methods 2.Electrical Distribution Systems 3.Special Machines	3	1	3
A17235 A17236 A17237	1.Electrical Estimation and Costing 2.Electrical Machine Design 3.Power System Planning	3	1	3
A17238 A17239	1.Electric Vehicles and Hybrid Vehicles 2.Energy Storage Systems Photo	3	1	3
A17288	Electrical Measurements Lab	--	3	2
A17493	Microprocessors and Interfacing Devices Lab	--	3	2
MP - I	Industry Oriented Mini Project	--	--	2
	Total	18	12	24

B.Tech EEE IV Year II Semester

Course Code	Subject	Lectures	T/P	Credits
A18240	Utilization Of Electrical Energy	3	1	3
A18241	Fundamentals of HVDC and FACTS Devices	3	1	3
A18244	EHVAC Transmission	3	1	3
MP-II, TS, CVV	Major Project, Seminar & Comprehensive Viva-Voce	---	--	(11+2+2)=15 16
	Total	9	3	24

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MICROPROCESSORS AND INTERFACING DEVICES

Course Objectives

1. To develop an in-depth understanding of the operation of microprocessors and microcontrollers
2. To interpret the 8086 architecture with its internal features.
3. To analyze the techniques involved in assembly language programming of 8086.
4. To understand the interfacing techniques and their applications.

Course Outcomes

At the end of the course the student should be able to

CO 1: Illustrate the internal architecture of 8086 and 8051

CO2: Understand and apply the fundamentals of assembly level programming of microprocessors and microcontroller.

CO 3: Explain the use of interrupts with suitable examples.

CO4: Demonstrate the interfacing of various peripheral devices with the microprocessor 8086

UNIT-I

8086 Microprocessor: Introduction to 8085 microprocessor- 8086 architecture- Functional Diagram- Register Organization- Memory segmentation- Memory addresses- physical memory organization- Signal descriptions of 8086- common function signals- Minimum and Maximum mode operation- Timing diagrams- Interrupt structure.

UNIT-II

Assembly Language Programming using 8086: Instruction formats- addressing modes- instruction set- assembler directives-procedures-macros- Simple programs.

UNIT-III

Interfacing with 8086 Microprocessor:8255 Programmable Peripheral Interface-Various Modes of Operation-Interfacing Keyboard- Display-Stepper motor- ADC-DAC-8259 Programmable Interrupt Controller -8257DMA controller.

UNIT-IV

Communication Interface: Serial communication standards- serial data transfer schemes- 8251 USART architecture and Interfacing- RS-232-TTL to RS 232C and RS232C to TTL conversion. Simple programs on serial data transfer-IEEE-488

UNIT-V

Introduction to Microcontrollers: Overview of 8051 microcontroller- Architecture- I/O ports and Memory organization- addressing modes and instruction set of 8051- Simple programs

TEXT BOOKS

1. Advanced Microprocessors and Peripherals — A. K. Ray and K.M. Bhurchandani- TMH- 2nd Edition 2006.
2. D. V. Hall- Microprocessors and Interfacing- TMGH- 2nd Edition 2006.
3. Kenneth. J. Ayala- The 8051 Micro controller 3rd Ed.- Cengage Learning.

REFERENCES

1. The 8051Microcontrollers- Architecture and Programming and Applications -K.Uma Rao- Andhe Pallavi- Pearson-2009.
2. Micro Computer System 8086/8088 Family Architecture- Programming and Design – Liu and GA Gibson- PHI-2nd Ed.
3. Microcontrollers and Application – Ajay. V. Deshmukh- TMGH- 2005
4. The 8085 Microprocessor: Architecture- programming and Interfacing K.Uday Kumar- B.S.Umashankar- 2008-Pearson

B.Tech EEE IV Year I- Semester

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3	1	0	3

POWER SYSTEM OPERATION AND CONTROL

Pre-requisite: Power Systems-I

OBJECTIVES: Objectives of this course are

- To understand importance of economic load dispatch
- To understand real time power control and operation
- To know the importance of frequency control
- To analyze different methods to control reactive power

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. 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.

UNIT -III Modeling

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

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 Load Frequency Control

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.

Load frequency control of 2-area system – uncontrolled case and controlled case, tie-line bias control Load Frequency Controllers: Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency 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. Power system operation and control, Dr.K. Uma Rao, wiley india Pvt.Ltd
2. Power systems Analysis, Operation and control, Abjith Chakrabarti, Sunitha Halder, PHI Publications

REFERENCE BOOKS:

1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma., THOMPSON, 3rd Edition.
2. Power system operation and control in power systems, GR.Chadrasekar Reddy, A.srinivasulu
3. Operation and control in power systems, PSR Murthy, BS publications
4. Power systems stability and control, Prabha Kundur, the McGraw-hill companies.
5. Power system analysis, C.L. Wadhwa, Newage International.
6. Modern Power system Analysis, I.J.Nagarath & D.P. Kothari Tata McGraw-hill Publishing Company Ltd.
7. Power system Analysis, Grainger and Stevenson, Tata McGraw Hill.

B.Tech EEE iV Year I- Semester

L	T	P	C
3	1	0	3

COMPUTER METHODS IN POWER SYSTEMS

Pre-requisites: Power Systems-I, Power Systems –II, Electrical Circuit Theory and Mathematics
OBJECTIVES: Objectives of this course, are

- to understand and develop Y-bus and Z-bus matrices
- to know the importance of load flow studies and its importance
- to understand the applications of short circuit studies
- to explain rotor angle stability of power systems

UNIT I:

Power System Network Matrices: Graph Theory: Definitions, Bus Incidence Matrix, Y-bus formation by Singular Transformation Methods and Direct Inspection methods, Numerical Problems.

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 (Numerical Problems). Modification of Z-bus for the changes in network (Problems).

UNIT II:

Power flow Studies: Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations,Classification of Buses and their relevance to Power Flow.

Load flow solution using Gauss Seidel Method: Acceleration Factor, Load flow solution without and with 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.

Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution without and with 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:

Per-Unit System of Representation: Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems.

Needs and assumptions for short circuit analysis.

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems.

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 without and with fault impedance, Numerical Problems.

UNIT IV:

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:

Transient Stability Analysis: Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Case study – sudden loss of parallel lines, 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.

OUTCOMES:

After this course, the student will be able to

- develop the Y-bus and Z-bus matrices
- develop load flow programs
- understand the importance of short circuit studies
- understand stability and instability power systems

TEXT BOOKS:

1. Power System Analysis, Dr.N.V.Ramana, Pearson Education India, 2011.
2. Computer methods in power system analysis, Stagg and EL-Abiad, Mc-Graw hill, 1987
3. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari, Tata McGraw-Hill Publishing Company, 4th edition.

REFERENCE BOOKS:

1. Power System Analysis, A.Nagoorkani, RBA Publications, 3rd edition
2. Power System Analysis and Stability, S.S. Vadhera, Khanna Publications
3. Power Sytem Analysis, Hadi Saadat, Tata McGraw Hill,2002.
4. Power System Analysis by J.J. Grainger and W.D. Stevenson, McGraw Hill,2016
5. Computer techniques and models in power systems, By K.Uma Rao, I.K.International, 2010
6. Computer Techniques in Power System Analysis by M.A.Pai, TMH Publications,1979
7. Power System Analysis, Grainger and Stevenson, Tata McGraw Hill.

B.Tech EEE IV Year I- Semester

L	T	P	C
3	1	0	3

OPTIMIZATION METHODS
(Professional Elective-3)

Pre-requisites: Electrical Circuit Theory, Electronic Devices and Circuits, Engineering Mathematics

OBJECTIVES: Objectives of this course are

- To introduce various optimization techniques i.e classical, linear programming, transportation problem, simplex algorithm, dynamic programming
- Constrained and unconstrained optimization techniques for solving and optimizing an electrical and electronic engineering circuits design problems in real world situations.
- To explain the concept of Dynamic programming and its applications to project implementation.

UNIT-I

Introduction & Classical Optimization Techniques: Statement of an Optimization problem - design vector - design constraints - constraint surface - objective function - objective function surfaces - classification of Optimization problems 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 simplex method - simplex algorithm.

UNIT – III

Transportation Problem & Unconstrained Optimization: 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, one dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method. 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,

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.

OUTCOMES: After this course, the student will be able to

- explain the need of optimization of engineering systems
- understand optimization of electrical and electronics engineering problems
- apply classical optimization techniques, linear programming, simplex algorithm, transportation problem
- apply unconstrained optimization and constrained non-linear programming and dynamic programming
- formulate optimization problems.

TEXT BOOKS:

1. Engineering optimization. Theory and practice". S. S.Rao, New Age International (P) Limited, 4th edition, 2009
2. Optimization Methods in Operations Research and systems Analysis, K.V. Mittal and C. Mohan, New Age International (P) Limited,3rd edition

REFERENCE BOOKS:

1. Operations Research, Dr.S.D.Sharma, KedarNath Ram Nath, 1972
2. Introductory Operations Research, H.S. Kasene & K.D. Kumar, Springer (India), Pvt Ltd, 6th edition
3. Operations Research: An Introduction, H.A.Taha, Pearson Pvt. Ltd, 8th Edition, Pearson/Prentice Hall, 2007.
4. Operations Research, Richard Bronson, Govindasami Naadimuthu, Tata Mc GrawHill Company Limited,2nd edition 2003
5. Linear programming, Springer series in operations research, George Bernard Dantzig, Mukund Narain Thapa, 3rd edition, 2003.

B.Tech EEE IV Year I- Semester

L	T	P	C
3	1	0	3

ELECTRICAL DISTRIBUTION SYSTEMS
(Professional Elective-3)

Pre-requisites: Power Systems – I and Power Systems - II

OBJECTIVES: Objectives of this course are

- to distinguish between transmission and distribution systems
- to understand design considerations of feeders
- to compute voltage drop and power loss in feeders
- to understand protection of distribution systems
- to examine the power factor improvement and voltage control

UNIT - I

Introduction & General Concepts: Introduction to distribution systems: Load modelling and characteristics. Coincidence factor, contribution factor loss factor – Relationship between the load factor and loss factor.

Classification of loads: Residential, commercial, Agricultural and Industrial loads and their characteristics.

UNIT - II

Distribution Feeders & Substations: Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system. Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

UNIT - III

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.

UNIT - IV

Protective Devices & Co Ordination: Objectives of distribution system protection, types of common faults and procedure for fault calculations.

Protective Devices: Principle of operation of Fuses, Circuit Reclosure, and line sectionalizes, and circuit breakers. Coordination of Protective Devices: General coordination procedure.

UNIT - V

Voltage Control & PF Improvement: Equipment for voltage control, effect of series capacitors, line drop Compensation, effect of AVB/AVR. Power-factor control using different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and Switched), capacitor allocation - Economic justification - Procedure to determine the best capacitor location.

OUTCOMES:

After this course, the student will be able to

- distinguish between transmission, and distribution line and design the feeders
- compute power loss and voltage drop of the feeders
- design protection of distribution systems
- understand the importance of voltage control and power factor improvement

TEXT BOOKS:

1. Electrical Power Distribution Systems, V.Kamaraju, Tata Mc Graw Hill Publishing company, 2nd edition, 2010.
2. Electric Power Distribution System Engineering, Turan Gonen, CRC Press, 3rd edition
3. Electrical Distribution Systems, Dr. S. Siva Naga Raju, Dr.K.Shankar, Danapathi Rai Publications

REFERENCE BOOKS:

1. Electric Power Generation, Transmission and Distribution, S.N. Singh, PHI Publishers, 2nd edition
2. Electrical Power Distribution hand book, G. Ram Murthy, University Press, 2nd edition.
3. Electric Power Distribution, Tata McGraw Hill Publishing Company, A.S. Pabla, 5th edition, 1997.

B.Tech EEE IV Year I- Semester

L	T	P	C
3	1	0	3

SPECIAL MACHINES
(Professional Elective- 3)

Pre-requisites: Electrical Machines-I and Electrical Machines-II

OBJECTIVES: Objectives of this course is to make the student to

- comprehend the necessity and significance of special machines
- understand the features of stepper motor
- get awareness of switched reluctance motors
- gain knowledge of Brushless DC motors
- become familiar about linear induction motor.

UNIT-1

SPECIAL TYPES OF D.C MACHINES-I

Series booster-Shunt booster-Non-reversible boost-Reversible booster

SPECIAL TYPES OF DC MACHINES –II

Armature excited machines - Rosenberg generator- The Amplidyne and Metadyne -Rototrol and Regulex-third brush generator-three wire generator-dynamometer.

UNIT -II

STEPPER MOTORS

Introduction-synchronous inductor (or hybrid stepper motor), Hybrid stepping motor, construction, principles of operation, Energization with two phase at a time- essential conditions for the satisfactory operation of a 2-phase hybrid step motor- very slow- speed synchronous motor for servo control-different configurations for switching the phase windings-control circuits for stepping motors-an open-loop controller for a 2-phase stepping motor.

UNIT-III

SWITCHED RELUCTANCE MOTOR

Introduction – improvements in the design of conventional reluctance motors- Some distinctive differences between SR and conventional reluctance motors - principle of operation of SRM - power converter for SR motor - Rotor sensing mechanism and logic control, drive and power circuits, position sensing of rotor with Hall probes - derivation of torque expression,- control of SR Motor for traction -type load

UNIT –IV

PERMANENT MAGNET MATERIALS AND MOTORS

Introduction, Hysteresis loops and recoil line- stator frames (pole and yoke - part) of conventional PM dc Motors, Equivalent circuit of a PM-Development of Electronically commutated dc motor from conventional dc motor.

BRUSHLESS DC MOTOR

Types of construction - principle of operation of BLDM- sensing and switching logic scheme, sensing- logic controller, lockout pulses - drive and power circuits,- Base drive circuits, power converter circuit- Theoretical analysis and performance prediction, modelling and magnet circuit d-q analysis of BLDM -transient analysis

UNIT-V

LINEAR INDUCTION MOTOR

Development of a double sided LIM from rotary type IM- A schematic of LIM drive for electric traction development of one sided LIM with back iron-field analysis of a DSLIM fundamental assumptions.-

Course Outcomes: After completion of the course, the student will be able to

- distinguish the various special machines based on the application.
- apply knowledge on control aspect of stepper motors and variable reluctance motors.
- identify the magnetic materials for the given application
- choose a proper sensor for the operation of machines
- model a given machine for a given application and its relevant assumptions
- derive torque expression for a given machine and its significance

TEXT BOOKS

1. K.Venkataratnam :Special electrical machines, university press, , 2009
2. R.K. Rajput : Electrical machines - 5th edition, Lakshmi Publications
3.V.V.Athani - Stepper motor: Fundamentals, Applications and Design, New age International publishers.

B.Tech EEE IV Year I- Semester

L	T	P	C
3	1	0	3

ELECTRICAL ESTIMATION AND COSTING

(Professional Elective-4)

Pre requisites: Electric Circuit Theory, Network Theory, Power Systems –II, Switch Gear and Protection

OBJECTIVES: The objectives of this course are

- To emphasize the estimating and costing aspects of all electrical equipment, installation and designs to analyze the cost viability.
- Exposure to design and estimation of wiring, design of overhead and underground distribution lines, substations and illuminations design.
- To successfully estimate costing of the products / projects that are part of our everyday usage.

UNIT-I

Design of Simple electric circuits: Electrical diagrams- classification of diagrams according to purpose - methods of representation for wiring diagram. System of connection of appliances and accessories - schematic wiring and single line diagram. Design and drawing of panel boards. Design conditions – standard sizes of boards – materials used.

UNIT-II

Design Considerations of Electrical Installations: Electric Supply System - Three phase four wire distribution system - Protection of Electric Installation against over load - short circuit and Earth fault – Earthing - General requirements of electrical installations - testing of installations - Indian Electricity rules - Neutral and Earth wire.

UNIT- III

Types of loads - Systems of wiring - Service connections - Service Mains- Sub-Circuits -Location of Outlets - Location of Control Switches - Location of Main Board and Distribution board - Guide lines for Installation of Fittings - Load Assessment - Permissible voltage drops and sizes of wires - Estimation and Costing of Electric installations.

UNIT - IV

Electrical Installation for Different Types of Buildings and Small Industries: Electrical installations for residential buildings - estimating and costing of material - Electrical installations for commercial buildings - high rise buildings. Electrical installations for small industries.

UNIT - V

Overhead and Underground Transmission and Distribution Lines: Introduction - Supports for transmission lines - Distribution lines - Materials used - Underground cables - Mechanical Design of overhead lines - Design of underground cables.

OUTCOMES: After the course, the student

- acquires knowledge in estimation and costing aspects of all electrical equipment,
- obtains knowledge on installation and designs to analyze the cost viability
- will be exposed to design and estimation of wiring, design of overhead and underground distribution lines, substations and illuminations

TEXT BOOKS:

1. Electrical Design Estimating and Costing, K. B. Raina, S. K. Bhattacharya, New Age International Publisher,5th edition
2. Design of Electrical Installations, Er. V. K. Jain, Er. Amitabh Bajaj, University Science Press.
3. Electricity Pricing Engineering Principles and Methodologies, Lawrence J. Vogt, P. E., CRC Press.
4. Electrical Installation Estimating and Costing by J.B.Gupta, 8th edition, S.K.Katria and Sons, New Delhi.

REFERENCE BOOKS:

1. Code of practice for Electrical wiring installations,(System voltage not exceeding 650 volts), Indian Standard Institution, IS: 732-1983.
2. Guide for Electrical layout in residential buildings, Indian Standard Institution, IS: 4648-1968.
3. Electrical Installation buildings Indian Standard Institution, IS: 2032.
4. Code of Practice for selection, Installation of Maintenance of fuse (voltage not exceeding 650V), Indian Standard Institution, IS: 3106- 1966.
5. Code of Practice for earthling, Indian Standard Institution, IS:3043- 1966.
6. Code of Practice for Installation and Maintenance of induction motors, Indian Standard Institution, IS: 900-1965.
7. Code of Practice for electrical wiring, Installations (system voltage not exceeding 650 Volts), Indian Standard Institution, IS: 2274-1963.
8. Electrical Installation, estimating and costing, Gupta J. B., Katson, Ludhiana.

B.Tech EEE IV Year I- Semester

L	T	P	C
3	1	0	3

ELECTRICAL MACHINE DESIGN
(Professional Elective-4)

Course Objectives:

- To understand the nature of various Electrical Engineering Materials.
- To understand the Specifications of various A.C. and D.C. machines.
- To know the importance of magnetic and thermal circuit calculations in the design aspect.
- To know the various design features of Electrical machines.

UNIT -I: Basic Considerations in Machine Design Principles of Design: Introduction-Types of Electrical Machines, Specifications, Limitations in Design-O/P Co-efficient, Importance of specific loadings-effects of materials on design, General design procedure. Electrical Materials: Conducting Materials and their properties, Classification, Applications Insulating Materials and their properties, Classification, Applications, Magnetic Materials and their properties, Classification, Applications.

UNIT-II: Design of Magnetic circuit and Thermal circuit Magnetic circuit Design: Magnetic circuits of Electrical machines-Laws of magnetic circuits, Ampere turns for magnetic circuit-Calculation of Magnetic circuit of D.C.Machine and Induction Motor. Thermal circuit Design : Temperature rise in Electrical machines-Standard ratings of electrical machines-Modes of heat dissipated-Quantity of Cooling Medium required.

UNIT-III: Design of DC Machines: Important features of DC Machines, O/P equation-Selection of Specific magnetic and electrical loadings-factors effecting selection of no. of poles-Selection of core length and Diameter, Calculation of length of air gap, Design of shunt field system-Design of armature winding only.

UNIT-IV: Design of Transformers: Introduction, O/P Equation (both 1ϕ& 3ϕ), E.M.F./turn, Different dimensions of Transformer, Steps to design a Transformer, Design of Main dimensions of Transformer Tank.

UNIT-V: Design of A.C. Rotating machines: Design of 3ϕ Induction Motor: Introduction-O/P Equation-Estimation of main Dimensions, air gap length of Induction Motor. Design of 3ϕ Alternators: Introduction-O/P Equation, Estimation of main dimensions, length of air gap, Estimation of turns /phase, Design of tooth and slot.

Course Outcomes: After the completion of this course the student will be able to

- Select a suitable material for a given application.
- Identify the need and required pre-requisites for machine design.
- Distinguish the appropriate design procedure for a given DC/AC machine.
- Determine the main dimensions of a given DC/AC machine.
- Design a proper cooling system for a given machine.

Text Books:

1. K.G.Upadhyay, "Design of Electrical Machines", New Age International Publishers, NewDelhi,2013.
2. Dr. V.N.Mittle & A.Mittal, "Design of Electrical Machines", 5 th reprint Edition, Standard Publishers Distributors, New Delhi, 2013.

Reference Books:

1. A.K.Sawhney,"A Course in Electrical Machine Design", 6 th Edition, Dhanpat Rai & Co.(P) Ltd.,Delhi,2014.
2. R.K.Agarwal, "Principles of Electrical Machine Design", 5 th Edition, S.K.Kataria & Sons, Delhi, 2014.
3. M.G.Say, "The Performance and Design of Alternating Current Machines", 3 rd Edition, CBS Publishers & Distributors, Delhi,2002

B.Tech EEE IV Year I- Semester

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3	1	0	3

POWER SYSTEM PLANNING
(Professional Elective-4)

Prerequisite: Power Systems I, Power Systems II

OBJECTIVES:

- To understand power planning and tools used for planning.
- To understand integrated power generation, cogeneration, transmission and distribution planning and power sector finances
- To study power system reliability planning, load management, reactive power management and online power flow.
- To study the environmental effects of power plant pollution, overhead transmission lines and technical impacts.

UNIT I

Introduction of power planning: National and Regional Planning- integrated resources planning- least cost utility planning- structure of Power System- planning tools- Electrical Regulation – Electricity acts- Indian electricity Act 1910 - Electricity (Supply) Act - Indian electricity rules 1956 - Electricity act 2003 - Electricity Act 2010 - Electrical forecasting, - Forecasting techniques- Mathematical modelling and simulation.

UNIT II

Integrated Power Generation: Generation planning - cogeneration/captive power - renovation and modernization of power plants - power pooling and power trading,

Transmission and distribution planning: Planning Criteria - HVDC Transmission - Flexible AC Transmission System - Reactive Power Planning - Rural electrification.

Power system economics: Power sector finance - Financial planning - private participation - Rural electrical investment - Concept of rational tariffs.

UNIT III

Power System Reliability Operation and Maintenance Planning: System reliability- Reliability planning - System operation planning - Load management - Load prediction - Reactive power balance. Online power flow studies - State estimation - Computerized management - Power system simulator.

UNIT IV

Energy Efficiency: Sustainable growth - Energy efficient technologies - Demand side management - Efficient energy use - Supply side management - Energy audit measuring instruments.

UNIT V

Environmental Effects: Environmental impacts of Power generation-Power plants pollution: The green house effect- Hydro plants - Nuclear Plants - Wind mills - Geothermal generation, Fuel cell and their effects. High Voltage overhead transmission lines - Technological impacts.

OUTCOMES:

After the course, the student

- acquires knowledge on, power planning and tools used for planning
- acquires knowledge on integrated power generation, cogeneration, transmission & distribution planning and power sector finances, power system reliability planning, load management, reactive power compensation and online power flow studies.
- Will be able to prepare optimal power system expansion planning, operation and maintenance costs of various power plants.

TEXT BOOKS:

1. Electrical Power System Planning, A.S.Pabla, Machmillan India Ltd.
2. Modern Power System Planning, X.Wang, J.R.Mc Donald, MGH publishers.
3. Electric Power System Planning: Issues, Algorithms and solutions, Hossein Seifi, Mohammad Sadegh Sepasian, Springer

REFERENCE BOOKS:

1. Power System restructuring engineering and economics, M.Tllick, F.Falina and L.Fink, Kulwar Academic Publisher.

B.Tech EEE IV Year I- Semester

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ELECTRICAL MEASUREMENTS LAB

Course Objectives:

1. To know the procedures for measuring Resistance, Inductance and Capacitance of different ranges using bridges
2. To perform experiments to measure three phase power, frequency, core losses.
3. To design experiments for calibration of energy meter, power factor meter
4. To know the industrial practices of measuring dielectric strength of transformer oil & Testing.

Any ten of the following experiments are required to be conducted

1. Calibration and Testing of single phase energy Meter.
2. Calibration of dynamometer type power factor meter.
3. Crompton D.C. Potentiometer - Calibration of PMMC ammeter and PMMC voltmeter.
4. Kelvin's double Bridge - Measurement of resistance - Determination of Tolerance.
5. Dielectric oil testing using H.T. testing Kit.
6. Schering Bridge & Anderson Bridge.
7. Measurement of 3 Phase reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
9. LVDT and capacitance pickup - characteristics and Calibration.
10. Resistance strain gauge - strain measurements and Calibration.
11. Transformer turns ratio measurement using A.C. Bridge.
12. Measurement of ratio error and phase angle of given C.T. by comparison.

Course Outcomes: Upon completion of this Laboratory course student should be able

1. to calibrate and test single phase energy meter, calibrate PMMC voltmeter and calibrate LPF wattmeter
2. to measure resistance, inductance and capacitance
3. to measure 3-Φ reactive power,
4. to test dielectric strength of oil of transformers.
5. to calibrate LVDT and resistance strain gauge.

REFERENCE BOOKS:

1. A Course in Electrical and Electronics Measuremnts and Instrumentation, A.K.Sawhney, Dhanpat Rai & Co.
2. Electrical and electronics measurements and instrumentation, R.K.Rajput, S.Chand & Company Ltd.

B.Tech EEE IV Year I Semester

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0	0	2	1

MICROPROCESSORS AND INTERFACING LABORATORY

Course objective:

- The aim of the course is to simulate the art of writing the ALP for 8086 and 8051 microcontroller to interface peripheral devices for simple applications

Course Outcomes

At the end of the course the student should be able to

CO1. Apply the fundamentals of assembly level programming of microprocessors and microcontrollers.
CO2. Build a program on a microprocessor using instruction set of 8086 and 8051.
CO3. Evaluate Assembly language program for 8086 and 8051 microcontroller to interface peripheral devices for simple applications

Note: Minimum of 12 experiments to be conducted.

8086 MICROPROCESSOR:

1. Arithmetic Operations (addition, subtraction, multiplication and division)
2. Addition of two BCD numbers.
3. Ascending order/Descending order of an array of numbers.
4. Finding Largest/Smallest numbers in an array of numbers.
5. Generation of Fibonacci series.
6. Hexadecimal to Decimal conversions
7. ASCII to Decimal conversion
8. Program for sorting an array for 8086.
9. Program for searching for a number or character in a string for 8086.
10. Program for string manipulations for 8086.

MASM PROGRAMMING:

1. Arithmetic Operations (addition, subtraction, multiplication and division)
2. Addition of two BCD numbers.
3. Ascending order/Descending order of an array of numbers.
4. Finding Largest/Smallest numbers in an array of numbers.
5. Generation of Fibonacci series.
6. Hexadecimal to Decimal conversions

8051 MICROCONTROLLER:

1. Arithmetic Operations (addition, subtraction, multiplication and division)
2. Addition of two BCD numbers.
3. Ascending order/Descending order of an array of numbers.
4. Finding Largest/Smallest numbers in an array of numbers.
5. Generation of Fibonacci series.
6. Masking of Bits.
7. Hexadecimal to Decimal conversion.

INTERFACING WITH 8086 MICROPROCESSOR:

1. Stepper motor interfacing to 8086.
2. Elevator simulator interfacing to 8086.
3. seven- segment display interfacing to 8086.
4. Interfacing ADC and DAC to 8086.
5. Digit Key – interfacing to 8086.

B.Tech EEE IV Year II- Semester

L	T	P	C
3	1	0	3

UTILIZATION OF ELECTRICAL ENERGY

Pre-requisites: Electrical Machines-I and Electrical Machines-II

OBJECTIVES: The objectives of this course are

- To understand the fundamentals of illumination and good lighting .practices
- To understand the methods of electric heating and welding.
- To understand the concepts of electric drives and their application to electrical traction systems.

UNIT I:

ILLUMINATION: Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light.

VARIOUS ILLUMINATION METHODS: Discharge lamps, MV and SV lamps - comparison between tungsten filament lamps and fluorescent tubes, Energy Efficient Lamps -principle of operation, Basic principles of light control, Types and design of lighting and flood lighting.

UNIT-II:

ELECTRIC HEATING &WELDING:

ELECTRIC HEATING: Advantages and methods of electric heating, resistance heating induction heating and dielectric heating.

ELECTRIC WELDING: resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding

UNIT III:

ELECTRIC DRIVES: Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT IV:

ELECTRIC TRACTION-I:System of electric traction and track electrification. Review of existing electric traction systems in India, Magnetic Levitation - Bullet Trains. Special features of traction motor, advantages of electric braking. Mechanics of train movement, Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

UNIT V:

ELECTRIC TRACTION-II: Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation, adhesive weight and coefficient of adhesion.

OUTCOMES: After this course, the student

- gets a thorough knowledge on, electric drives characteristics and their applicability in industry based on the nature of different types of loads and their characteristics
- understands the concepts and methods of electric heating, welding, illumination and electric traction.
- can apply the above concepts to real-world electrical and electronics problems and applications.

TEXT BOOKS:

1. Utilisation of Electric Energy – by E. Openshaw Taylor, Orient Longman.
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, Revised edition, 1997.
3. Utilization of Electric Energy, VVL Rao, University Press.
4. Utilisation of Electric Power, Er. R.K. Rajput, Laxmi Publications

B.Tech EEE IV Year II- Semester

L	T	P	C
3	1	0	3

Fundamentals of HVDC and FACTS Devices

Prerequisites: Electrical Circuit, Control System, Power Electronics, Power Systems-I and Power Systems –II

OBJECTIVES: The objectives of this course are

- To facilitate the students to understand the basic concepts and recent trends in HVDC transmission.
- To introduce the application of a variety of high power- electronic controllers for active and reactive power in AC transmission lines.
- To enable the students to work with the concepts of HVDC transmission and are exposed to the basics and control of FACTS controllers.

UNIT-I

Introduction: Comparison of AC and DC transmission systems, application of DC transmission, types of DC links, typical layout of a HVDC converter station. HVDC converters, pulse number, analysis of 3 phase bridge (Graetz) circuit with and without overlap, converter bridge characteristics, equivalent circuits or rectifier and inverter configurations of twelve pulse converters.

UNIT-II

Converter & HVDC System Control: Principles of DC Links Control, converters control characteristics, system control hierarchy, firing angle control, current and extinction angle control, starting and stopping of DC link.

Harmonics, Filters and Reactive Power Control: Introduction, generation of harmonics, AC and DC filters. Reactive Power Requirements in steady state, sources of reactive power, static VAR systems.

UNIT-III

FACTS Concepts: Flow of power in AC parallel paths and meshed systems,Basic typesof FACTS controllers, brief description and definitions of FACTS controllers.VSC for FACTS applications.

UNIT-IV

Static Shunt Compensators: Objectives of shunt compensation, principles of shunt compensation- variable impedance type & switching converter type-static synchronous compensator (STATCOM) configuration-characteristics and control,SVC and STATCOM - comparision.

UNIT-V

Static Series Compensators: Objectives of series compensation, variable impedance type-thyristor switched series capacitors (TCSC), and switching converter type series compensators, static series synchronous compensator (SSSC)-power angle characteristics-basic operating control schemes, UPFC introduction(Block diagram)

OUTCOMES: After this course, the student

- will be skilled enough to work with the HVDC systems, being capable of analyzing the HVDC circuits and develop exquisite interest to work in the area of HVDC transmission.
- shall be able to explain the basic principles of different types of facts controllers and their characteristics.
- shall be able to model different FACTS controllers, form a basis for selecting a particular controller for a given application and analyze and compare the performance of various facts controllers.

TEXT BOOKS:

1. 'HVDC transmission systems', Padiyar, K.R., Wiley Eastern Ltd., 2010.
2. 'Concepts and Technology of Flexible A.C.Transmission System', Hingorani, L.Gyugyi, IEEE Press New York, 2000 ISBN –0780334588

REFERENCE BOOKS:

1.Direct Current Transmission-Vol.1,Kimbark, E.W Wiley Interscience,1971.
2. 'FACTS controllers for Transmission andDistribution systems' Padiyar K.R., New Age International Publishers, 1 st Edition,2007
3. 'HVDC Transmission', S.Kamakshaiah and V.Kamaraju1 st Edition,Tata McGraw Hill, 2011.
3.'FACTS – Modeling and simulation in PowerNetworks'Enrique Acha, Claudio R.Fuerte-Esqivel, Hugo Ambriz-Perez, Cesar Angeles-Camacho, John Wiley & Sons, 2002.

B.Tech EEE IV Year II- Semester

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EHV AC TRANSMISSION

Pre requisites: Electromagnetic Fields, Power Systems I, Power Systems II, Switch Gear and Protection

OBJECTIVES: The objectives of this course are

- To understand the concepts of extra high voltage AC transmission.
- To understand the behaviour of the line parameters for extra high voltages, voltage gradients of the transmission line conductors.
- To study the effect of corona, electrostatic field calculations, travelling wave theory concept,
- To study the effect of lightning, protection against lightning and voltage control

UNIT - I

Introduction: Necessity of EHV AC transmission - advantages and problems, power handling capacity and line losses- mechanical considerations - Resistance of conductors - Properties of bundled conductors - Line and ground reactive parameters: Line inductance and capacitance - sequence inductances and capacitances - modes of propagation - ground return.

UNIT - II

Voltage Gradients of Conductors: Electrostatics - field of sphere gap - field of line changes and properties – charge - potential relations for multi- conductors - surface voltage gradient on conductors - distribution of voltage gradient on sub-conductors of bundle.
Corona Effects: Power loss and Audible Noise (AN) - Corona loss formulae - Charge voltage diagram - Generation, characteristics, limits and measurements of Audible Noise - Radio Interference (RI) – corona pulses generation- Properties and limits for Radio Interference.

UNIT - III

Electro Static Field and Magnetic Fields: Electrostatic field: calculation of electrostatic field of EHV/AC lines - Effect on humans, animals and plants - Electrostatic induction on un-energized circuit of double-circuit line - Electromagnetic Interference - Meters and measurement of electrostatic fields.
Travelling wave theory: Travelling wave expression and solution- source of excitation - lumped parameters of distributed lines - generalized constants - no load voltage conditions and charging current.

UNIT –IV

Lightning and lightning protection: Lightning strokes on lines – lightning stroke mechanism - general principles of the lightning - protection problem - tower-footing resistance - insulator flashover and withstand voltages - probability of occurrence of lightning - stroke currents- lightning arresters and protective characteristics - dynamic voltage rise and arrester rating - operating characteristics of lightning arresters - insulation coordination based on lightning.

UNIT -V

Voltage Control: Power circle diagram and its use - voltage control using synchronous condensers - cascade connection - shunt and series compensation - sub synchronous resonance in series capacitor - compensated lines - static VAR compensating system.

OUTCOMES: After this course, the student

- gets a thorough knowledge on, general aspects and necessity of extra high voltage (EHVAC) transmission, advantages and disadvantages of EHVAC,
- understands concepts of voltage gradient, effects of corona, electro static field calculations.
- understands the theory of travelling waves, lightning strokes and protection, voltage control of EHVAC transmission.

TEXT BOOKS

1. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (p) Ltd, revised edition, 2007
2. HVAC and DC Transmission by S. Rao.

REFERENCE BOOKS

1. EHV Transmission line- Edison Electric Institute, Edison Electric Inst., 1968.