1. **Award of B.Tech. Degree**

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

i) **4 Year B.Tech. Course:**

- Pursued a course of study for not less than four academic years and not more than eight academic years.
- Students, who fail to complete their Four years Course of study within Eight years or fail to acquire the **180** Credits for the award of the degree within eight academic years from the year of their admissions, shall forfeit their seat in B.Tech course and their admissions shall stand cancelled.
- Students can also register for more number of credits from electives, however only one elective will be considered from that group to get the total 180 credits.

(ii) **Academic Regulations 2016-17 for B.Tech. (Lateral Entry Scheme)**

- A student will be declared eligible for the award of the B.Tech. Degree if he/she fulfills the following academic regulations.
- Pursued a course of study for not less than three academic years and not more than six academic years.
- Registered for 133 credits and secured 133 credits.
- Students can also register for a number of credits from electives, however only one elective will be considered from that group to get the total 133 credits.
2. Courses of Study
The following courses of study are offered at present for specialization in the B.Tech.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Abbreviation</th>
<th>Branch</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>CE</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td>02</td>
<td>EEE</td>
<td>Electrical &amp; Electronics Engineering</td>
</tr>
<tr>
<td>03</td>
<td>ME</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>04</td>
<td>ECE</td>
<td>Electronics and Communication Engineering</td>
</tr>
<tr>
<td>05</td>
<td>CSE</td>
<td>Computer Science Engineering</td>
</tr>
<tr>
<td>06</td>
<td>IT</td>
<td>Information Technology</td>
</tr>
</tbody>
</table>

3. Attendance Requirements:

- A student shall be eligible to appear for the end-semester examinations if he/she acquires a minimum of 75% of attendance in aggregate of all their subjects.
- Condensation of shortage of attendance in aggregate up to 10%(65% and above and below 75%) in each semester for genuine reasons, and shall be approved by a committee duly appointed by the college.
- A student shall be eligible to claim for condensation of attendance for coursework for a maximum of two times during the four-year (eight semesters) course work of regular B.Tech/three-year (six semesters) coursework of B.Tech, Lateral Entry. The college academic committee has to store recommend case by case based on genuineness.
- A student will not be promoted to the next semester (i.e. detained in the same semester) unless he/she satisfies the attendance requirement of the present semester.
mester. They may seek re-admission for that semester when offered next.

- **Shortage of Attendance below 65% in aggregates shall in NO case be condoned.**
- Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- A fee stipulated by the college shall be payable towards condonation of the shortage of attendance.

4. Examinations and Scheme of Evaluation

4.1 Theory Courses:

Each theory course shall be evaluated for a total of 100 marks, consisting of 40 marks for internal assessment and 60 marks for semester end examination.

**Internal Assessment:**

- Out of 40 marks for internal assessment, 20 marks are for subjective tests, 10 marks for objective tests and 10 marks for assignments.
- For theory subjects, during the semester there shall be 2 mid-examinations. The first mid-term examination (subjective + objective) shall be from the first three units of syllabus and second mid-term from the fourth, fifth and sixth units of the syllabus, conducted during the semester.
- The subjective examination is for 90 minutes duration conducted for 20 marks. Each subjective type test question paper shall contain 4 questions and all questions need to be answered and each question carries 5 marks.
- The objective examination is for 20 minutes duration conducted for 10 marks. Each objective type test question paper shall contain 20 multiple-choice question with a weightage of 1/2 Mark each.
• Themid-termmarks(subjectiveandobjective)shallbeawardedgivingaweighthageof24marksoutof30 (80%)tothemidexamination (Subjective-20,Objective-10)inwhichthestudentscoresmoremarks,6marks (20%)tothemidexamination in which the student scores less marks.

• Fortheorysubjects,duringthesemesterthere shallbefourAssignments conductedfor10marks. Theaverageofthebestthreeistobetak enforfinalizingtheassignmentmarks of 10.


**ExternalAssessment:**

• SemesterEndExaminationwillhavequestionsunderPart-AandPart-B withthree hoursdurationfor60marks. Part—Acontainsamandatoryquestion covering all the 6 units ofthesyllabus for 20 marks. Part —B has 6 questions (OnefromeachUnit).Thestudenthas toanswer4outof6questionsin Part—B andcarries aweightageof 10 marks each.

• ForsubjectslkeEngineeringDrawing / Engineering Graphics,MachineDrawing,BuildingPlanning&Drawing,etc.,th epatternofsemesterexaminationisgivenalongwiththesyllabusofrespective subjectandhas tobeconductedfor 60marks.

**4.2LaboratoryCourses:**

• Forpracticalsubjectsthe distributionshallbe50marksforInternal
Evaluation and 50 marks for the semester end examinations. There shall be continuous evaluation by the intern subject teacher during the semester for 50 internal marks of which 20 marks shall be for day-to-day performance, 10 marks for record and 20 marks shall be evaluated by conducting an internal laboratory test towards the end of the semester.

- Semester end examinations shall be conducted by the teacher concerned and external examiner for 50 marks.

4.3 Mini Project/Summer Internship/Audit course:

- The industry-oriented mini project/Summer internship shall be carried out during the summer break for a minimum of 4 weeks after the VI Semester and completed before the start of the VII Semester. A report along with a seminar has to be submitted at the beginning of the VII Semester for assessment by an internal evaluation committee comprising supervisor of the project, Project Coordinator (senior faculty) and Head of the Department for 50 marks. There shall be NO external evaluation.

Audit course
There shall be an internal evaluation for 50 marks. A candidate has to secure a minimum of 50% of marks to be declared successful. There shall be NO external evaluation. For non-credit courses ‘Satisfactory’ or ‘Unsatisfactory’ shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

Technical Essential (Elective)
- It is optional and additional certificate will be provided. The additional credits will be ’2’.
This course shall be evaluated for a total of 100 marks out of which 40 marks are allotted for internal assessment and 60 marks are allotted for external examination.
Internal Examination Question Paper Pattern:
- The internal examination will have questions under Part-A and Part-B with 2 hours duration for 40 marks and should be conducted along with second midterm examination.
- Part-A contains questions for 20 marks. This should contain 20 multiple choice questions with a weight age of 1 mark for each question.
- Part-B contains questions for 20 marks. This should contain 10 multiple choice questions covering the total syllabus with a weight age of 2 marks for each question.

External Examination Question Paper pattern:
- The external examination will have questions under Part-A and Part-B with 3 hours duration for 60.
- Part-A contains questions for 20 marks. This should contain 20 multiple choice questions with a weight age of 1 mark for each question.
- Part-B contains questions for 40 marks. This should contain 20 multiple choice questions covering the total syllabus with a weight age of 2 marks for each question.

4.4 Projectwork:
- The final project work shall be carried out during the 8th semester and will be evaluated for 100 marks. Out of 100 marks, 40 marks shall belong to internal evaluation and 60 marks for the project evaluation and semester-end viva-voce examination.
- Each student needs to give three seminars on the topic of his/her project, and these are evaluated for 40 marks (for all three seminars) by a committee consisting of the supervisor of the project, project coordinator (senior faculty) and Head of the Department. For seminars, the distribution of marks shall be as given: a) Seminar 1: 10 Marks b) Seminar 2: 15 Marks c) Seminar 3: 15 Marks
- The project evaluation and end-semester Viva-Voce shall be conducted by the committee consisting of an External Examiner, Head of the Department and Supervisor of the Project. Th
evaluation of project work shall be conducted at the end of the fourth year second semester.

5. Minimum Academic Requirements:

- A student shall register and put up minimum attendance of all 180 credits and earn all the 180 credits.
- Students can also register for a number of credits from electives however only one elective will be considered from that group to get a total of 180 credits.
- The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No. 3.
- A student shall be deemed to have satisfied the minimum academic requirement and earned the credits allotted to each theory or practical ald design or drawings subject or project if he/she secures not less than 35% of marks in the end examination and minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together.
- A student will be promoted to the second year if he/she puts up the minimum attendance requirement.
- A student shall be promoted from II to III year only if he/she fulfills the academic requirement of 50% of credits (rounded to the nearest highest credits) from regular and supplementary examinations of I year and II year examinations, irrespective of whether the candidate takes the examination or not. However attendance requirement mentioned in item No.3 is necessary.
- A student shall be promoted from third year to fourth year only if he/she fulfills the academic requirement of 50% of credits (rounded to the nearest highest credits) from regular and supplementary examinations of I year and II year and III year examinations, irrespective of whether the candidate takes the examination or not. However attendance requirement mentioned in item No.3 is necessary.
- A lateral entrant student will be promoted to II year to III year if he/
p the minimum required attendance in II year.

- A Lateral Entrance students shall be promoted from third year to fourth year only if he/she fulfills the academic requirement of 50% of credits (rounded to next highest credits) from regular and supplementary examinations of II year and III year examinations, irrespective of whether the candidate takes the examination or not. However, attendance requirement mentioned in item No.3 is necessary.
- All other regulations as applicable for B.Tech. Four-year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme)

6. Course pattern

- The entire course of study is of four academic years and each year will have TWO Semesters (Total EIGHT Semesters).
- A student eligible to appear for the end examination in a subject/lab, but absent for or withdrawn has failed in the end examinations may appear for the subject/lab supplementary examinations, when offered.
- When a student is detained due to lack of credits/shortage of attendance, he/she may be admitted when the semester is offered after fulfillment of academic regulations. Whereas the academic regulations hold good with other regulations he/she first admitted.

7. Award of Class

After satisfying the requirements prescribed for the completion of the program, the student shall be eligible for the award of B.Tech Degree and shall be placed in one of the following grades:

<table>
<thead>
<tr>
<th>Academic Performance (Theory/ Drawing)</th>
<th>Academic Performance (Laboratory/Project)</th>
<th>Letter Grade</th>
<th>Grade Points</th>
</tr>
</thead>
</table>

8
<table>
<thead>
<tr>
<th>Percentage Range</th>
<th>Percentage Range</th>
<th>Grade</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>90% to 100%</td>
<td>90% to 100%</td>
<td>O (Outstanding)</td>
<td>10</td>
</tr>
<tr>
<td>80% to &lt;90%</td>
<td>80% to &lt;90%</td>
<td>A+(Excellent)</td>
<td>9</td>
</tr>
<tr>
<td>70% to &lt;80%</td>
<td>70% to &lt;80%</td>
<td>A (VeryGood)</td>
<td>8</td>
</tr>
<tr>
<td>60% to &lt;70%</td>
<td>60% to &lt;70%</td>
<td>B+(Good)</td>
<td>7</td>
</tr>
<tr>
<td>50% to &lt;60%</td>
<td>50% to &lt;60%</td>
<td>B (AboveAverage)</td>
<td>6</td>
</tr>
<tr>
<td>45% to &lt;50%</td>
<td>–</td>
<td>C (Average)</td>
<td>5</td>
</tr>
<tr>
<td>40% to &lt;45%</td>
<td>–</td>
<td>P (Pass)</td>
<td>4</td>
</tr>
<tr>
<td>Below 40%</td>
<td>Below 50%</td>
<td>F (Fail)</td>
<td>0</td>
</tr>
<tr>
<td>Absent</td>
<td>Absent</td>
<td>Ab (Absent)</td>
<td>0</td>
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</table>

7.1 Calculation of Semester Grade Point Average (SGPA) *for semester:

The performance of each student at the end of the each semester is indicated in terms of SGPA. The SGPA is calculated as given below:

\[ \text{SGPA} = \frac{\sum (\text{CR} \times \text{GR})}{\sum \text{CR}} \]

Where
- CR = Credit of a course
- GR = Grade Points awarded for a course

*SGPA is calculated for a candidate who passed all the courses in the semester.

7.2 Calculation of Cumulative Grade Point Average (CGPA) for Entire Program:

The CGPA is calculated as given below:

\[ \text{CGPA} = \frac{\sum (\text{CR} \times \text{GR})}{\sum \text{CR}} \]

Where
- CR = Credit of a course
- GR = Grade Points awarded for a course

8. Revaluation:

- Students can submit the applications for revaluation, along with the prescribed fee receipt for revaluation of his answerscript(s) of theor
ycourse(s)as per thenotification issued by the Controller of Examinations.

9. Re-Admission/Re-Registration/Re-Appearance:

(i) Re-Admission for discontinued students:
Students who have discontinued the Degree Programme due to any reason whatsoever, maybe considered for re-admission into the same Degree Programme with the regulations prevailing at the time of re-admission, with prior permission from the concerned authorities.

(ii) Re-Registration for Detained students:
When any student is detained due to shortage of attendance in any semester, he/she may be permitted to register for the same or equivalent subject (as suggested by the Board of Studies of that Department) as when offered in the subsequent semester following the same regulations with which he/she got admitted, with prior permission from the concerned authorities.

(iv) Transfer candidates (from non-autonomous college affiliated to JNTUK):
A student who is following JNTUK curriculum, transferred from other college to this college in second-year first semester or subsequent semester shall join with the autonomous batch in the appropriate semester. Such candidate shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onward. The student shall fulfill all his backlogs subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The student shall clear all his backlogs subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of creditstobe secured for the award of the degree will be the sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The clas
swill be awarded based on the academic performance of a student in the autonomous pattern.

(v)
**Transfer candidates (from an autonomous college affiliated to JNT UK):**
A student who has secured the required credits up to previous semesters as per the regulations of other autonomous institutions shall also be permitted to be transferred to this college. A student who is transferred from the other autonomous college to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the course(s) in the program prescribed by the Board of Studies concerned for that batch of students from that semester onward to be eligible for the award of degree. However, exemption will be given in the course(s) of the semester(s) of the batch which he/she had passed earlier and substitutes subjects are offered in their place as decided by the Board of Studies. The total number of credits obtained for the award of the degree will be the sum of the credits up to previous semesters as per the regulations of the college from which he/she is transferred and the credits prescribed for that semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

(vi) With holding of Results
If the student has not paid dues to College, or if any case of indiscipline is pending against him/her, the result of the candidate may be withheld and he/she will not be allowed to go into the next higher Semester. The award or issue of the Degree may also be withheld in such cases.

10. Minimum Instruction Days:
The minimum instruction days for each semester shall be 90 clear instruction days.

11. General:
- The academic regulations should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the College Academic Committee is final.
- The Principal may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the College.
- The Academic Regulations should be read as a whole for the purpose of any interpretation.
- The College reserves the right to alter the Academic Regulations and/or Syllabus/Course Structure, as and when necessary. The modifications or amendments may be applicable to all the candidates on the rolls, as specified by the College.
- Wherever the words ‘he’ or ‘him’ or ‘his’ occur in the above regulations, they will also include ‘she’ or ‘her’ or ‘hers’.
- Wherever the word ‘Subject’ occurs in the above regulations, it implies the ‘Theory Subject’, ‘Practical Subject’ or ‘Lab.’ and ‘Seminar’.
- In case of any ambiguity or doubt in the interpretation of the above regulations, the decision of the College Academic Committee will be final.

### DISCIPLINARY ACTION FOR MALPRACTICES/IMPROPER CONDUCT IN EXAMINATIONS

<table>
<thead>
<tr>
<th>Nature of Malpractices</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(a) If the candidate possesses or keeps accessible in examination hall, any paper, notebook, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
</tbody>
</table>
(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)

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<tbody>
<tr>
<td>1(b)</td>
<td>Gives assistance or guidance or receives it from many other candidates orally or by any other body language methods or communicates through cellphones with any candidate or persons in or outside the exam hall in respect of any matter.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>2</td>
<td>Has copied in the examination hall from many 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.</td>
</tr>
<tr>
<td></td>
<td>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</td>
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<tr>
<td></td>
<td>theremainingexaminations ofthe subjects ofthatSemester/year. The Hall Ticketofthecandidate is tobecancelled.</td>
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<tr>
<td>3</td>
<td>Impersonates any othercandidate in connection withtheexamination.</td>
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</tbody>
</table>

Thecandidatewhohasimper
sonatedshall
beexpelledfromexaminatio
nhall. Thecandidate is alsodebarredandforfeits the seat.
Theperformanceoftheorigin
al candidatewho has been impersonated,
shallbecancelled in all the subjects oftheexamination (includingpractical’sandpr
ojectwork)already
appearedand shall
notbeallowedtoappearfor
examinations
oftheremainingsubjects
ofthat semester/year.
Thecandidate is alsodebarredfor
twoconsecutive semesters fromclassworkandall
examinations.
Thecontinuation
ofthecourseby thecandidate is
subjecttotheacademicregul
ations in connection
<p>| | |</p>
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<tbody>
<tr>
<td>4</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the others subject to the candidate has already appeared including practical examinations and project works 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 examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with</td>
</tr>
<tr>
<td></td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiner or writes to the examiner requesting him to award pass marks.</td>
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</tr>
<tr>
<td>5</td>
<td>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 walkout or instigates others to walk out, or threatens the officer in charge or any person on duty in or outside the examination hall or any injury to his person or to any of his relations whether by words, either spoken or written or by sign or visible representation, assaults the officer in charge, or any person on duty in or outside the examination hall or any of his relations, or</td>
</tr>
<tr>
<td>Number</td>
<td>Description</td>
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<tr>
<td>7</td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
</tr>
</tbody>
</table>

- indulges in any other act of misconduct 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 has the tendency to disrupt the orderly conduct of 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 shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate... |
<p>| | | |</p>
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<td></td>
<td></td>
<td>idate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td>8</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
<td>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 the eighth semester/ year. The candidate is also debarred and forfeits the seat.</td>
</tr>
<tr>
<td>9</td>
<td>If student of the college, who is not a candidate for the particular examination or any person</td>
<td>Student of the college expels from the examination hall and cancellation</td>
</tr>
<tr>
<td></td>
<td>notconnectedwith thecollege indulges inany malpracticeor improperconductmentioned in clause6 to</td>
<td>oftheperformance inthat subjectandall other subjectsthecandidate has already appearedincludingpractical examinationsandprojectworkand shall notbepermittedfor theremainingexaminations ofthe subjects ofthatsemester/year. Thecandidate isalso debarredandforfeits the seat.Person(s)whodo notbelongtotheCollegewill be handedover topoliceand apolicecasewill beregisteredagainstthem.</td>
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</tr>
<tr>
<td>10</td>
<td>Comes in adrunken conditiontotheexamination hall.</td>
<td>Expulsion fromtheexamination hallandcancellation oftheperformance in that subjectandall other subjectsthecandidate has already appearedincludingpractical examinationsandprojectworkand shall notbepermittedfor theremainingexaminations</td>
</tr>
<tr>
<td></td>
<td>of the subjects of that semester/year</td>
<td></td>
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<td>---</td>
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</tr>
<tr>
<td>11</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the College for further action towards suitable punishment.</td>
<td></td>
</tr>
</tbody>
</table>
Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- Ragging within or outside any educational institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to astudent

<table>
<thead>
<tr>
<th>Crime Description</th>
<th>Imprisonment upto</th>
<th>Fine Upto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teasing, Embarrassing and Humiliation</td>
<td>6 Months</td>
<td>₹ 1,000</td>
</tr>
<tr>
<td>Assaulting or Using Criminal Force or Criminal Intimidation</td>
<td>1 Year</td>
<td>₹ 2,000</td>
</tr>
<tr>
<td>Wrongfully restraining or confining or causing hurt</td>
<td>2 Year</td>
<td>₹ 5,000</td>
</tr>
<tr>
<td>Causing grievous hurt, kidnapping or Aducts or rape or committing unnatural offence</td>
<td>5 Year</td>
<td>₹ 10,000</td>
</tr>
<tr>
<td>Causing death or abetting suicide</td>
<td>10 Months</td>
<td>₹ 50,000</td>
</tr>
</tbody>
</table>

In case of Emergency CALL TOLL FREE NO.: 1800 - 425 -1288

LET US MAKE QIS RAGGING FREE
Ragging

ABSOLUTELY
NO TO RAGGING

1. Ragging is prohibited as per Act 26 A.P. Legislative Assembly, 1997.

2. Ragging entails heavy fines and/or imprisonment.

3. Ragging invokes suspension and dismissal from the College.

4. Outsiders are prohibited from entering the College and Hostel without permission.

5. Girl students must be in their hostel rooms by 7.00 p.m.

6. All students must carry their Identity Card and show them when demanded.

7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

In case of Emergency CALL TOLL FREE NO.: 1800 - 425 - 1288

LET US MAKE QIS RAGGING FREE
ELECTRICAL AND ELECTRONICS ENGINEERING – B.Tech.
COURSE STRUCTURE AND SYLLABUS
### I B. Tech. EEE Branch

<table>
<thead>
<tr>
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<td>Theory</td>
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<td>Theory</td>
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<td>P</td>
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ENGLISHFORENGINERS-I
I Year –I Sem

Course Objectives:
- To provide expertise in language and proficiency to engineering professionals.
- To improve communication skills.
- To enhance competencies in writing essays and gist of the passage in own words.
- To express ideas in own words.
- To acquire the ability to write formal and informal letters and emails.
- To understand rules of grammar in writing.
- To develop the creativity of the students related to verbal ability and reasoning.
- To develop the ability of understanding of other subjects.

Course Outcomes:
Students will be able to….
- Assess their language skills and apply them to their real life situations.
- Employ pre-reading, skimming and pre-writing techniques;
- Identify and apply writing process principles to various assignments.
- Analyze and apply study strategies including underlining, taking notes and outlining.
- Increase confidence in their ability to read, comprehend, organize, and retain written information.
- Design formal and informal formats of letters and emails.

Unit-1 Engineering Technologies
Solar Thermal Power- Nanotechnology: Compound Nouns, Writing instructions, Note-making, Prefixes, Imperatives, Interpreting charts and pictures, Role play, Subject-verb agreement, Listening, Speaking, Reading and Writing activities.
Letter Writing -https://www.thebalance.com/cover-letter-format-2060205

VOCABULARY: Units from 1 to 3: Word families in language- http://www.englishvocabularyexercises.com/academic-word-list/ (sub list exercises)


Unit-3: J.C. Bose- Trail Blazers. - Orient Black Swan Pvt. Ltd. Publishers

Paragraph Writing -
https://awc.ashford.edu/PDFHandouts%5CHow%20to%20Write%20a%20Good%20Paragraph_final.pdf

VOCABULARY: Units from 4 to 6: Word families in language- http://www.englishvocabularyexercises.com/academic-word-list/ (sub list exercises)


Unit-5 Space Track
Hubble Telescope-Chandrayaan-Anusat-: Group discussion, Double consonants, Future tense, Affixes, Debates, Predicting and Problem Solving, Adverbs, Listening, Speaking, Reading and Writing activities.

Unit-6 Global Issues
Child Labor- E-waste: Making Conversation, SMS and use of emotions, Group discussion, Antonyms, Homonyms and homophones, Past participles for irregular verbs, E-mail communication-Listening, Speaking, Reading and Writing activities.
**Reading Comprehension Module -1: Winter time**

**VOCABULARY:** Units from 7 to 9: Word families in language-
http://www.englishvocabularyexercises.com/academic-word-list/
(sub list exercises)

**Prescribed Books and References**

**Main Reader:** Mindscapes-English for Technologists and Engineers- Orient Black Swan Pvt. Ltd. Publishers

**Supplementary Reader:** Trail Blazers. - Orient Black Swan Pvt. Ltd. Publishers

**English Grammar Practice:**

**Vocabulary**
http://www.englishvocabularyexercises.com/academic-word-list/
(sub list exercises)

**REFERENCES:**


ENGINEERINGMATHEMATICS–I
I Year –I Sem

Course objectives:
- To acquaint the students with principles of mathematics through Differential Equations, Sequence & Series, Fourier series.
- To understand the concepts of curve tracing, applications of integration and functions of several variables that serves as an essential tool in several engineering applications.

Learning Outcomes:
Student will be able to
- Use analytical techniques to compute solutions of ordinary differential equations.
- Apply the knowledge of solving higher order linear Ordinary differential equations in some Engineering problems like Electrical circuits, Deflection of beams, Mechanical oscillatory systems, Simple Harmonic Motion etc.,
- Use the method of differences to sum finite series, and extend its use to infinite series
- Understand the concept of Fourier series and be able to give Fourier expansions of a given function
- Compute maxima and minima of two variables by applying the techniques of partial differentiation.
- Estimate arc lengths, areas, volume and surface area of revolution by applying integration techniques.
UNIT I Differential equations of first order and first degree:
Linear-Bernoulli-Exact-Reducible to exact.

UNIT II Linear differential equations of higher order:
Homogeneous equations of higher order -Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}, \sin ax, \cos ax$, polynomials in x, $e^{ax} v(x), xv(x)$.

UNIT III Curve Tracing: Curve tracing -Cartesian - Polar curves.

Applications: Maxima and Minima of functions of two variables with constraints and without constraints - Lagrange’s method of undetermined multipliers.

UNIT VI Applications of Integration: Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates.

TEXT BOOKS:

REFERENCE BOOKS:
ENGINEERING PHYSICS

I Year – I Sem

OBJECTIVES:
- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

OUTCOMES:
- Understand the Utilization of laser technology in various disciplines and also understands the concepts of optical fiber and its applications.
- Get a strong foundation in understanding of structural solids and properties of materials, application of concepts of nanoscience in technology and gains the knowledge in the properties of nanosized materials.
- Understand the importance of Magnetic phenomenon, the concepts of magnetism, superconductivity and applications of different types of magnets and superconductors in various discipline.
- Have a fundamental knowledge of acoustics which would facilitate in acoustical design of buildings, and be able to employ ultra-Sonic’s as an engineering tool.
- Familiar with Basic Elements of Quantum Theory and to correlate advanced topics in Physics with Engineering Applications.
- Know the properties of semiconductor materials by projecting the view of energy bands and analyzing the characteristics of semiconductor components like various diodes.

UNIT 1 - PHOTONICS AND FIBRE OPTICS

Photonics:
Absorption, Spontaneous and stimulated emission, Types of Pumpings, Metastable states, Population inversion, Einstein’s A & B coefficients - Derivation, Types of lasers, Ruby laser, He-Ne laser, introduction of Semiconductor lasers, Industrial and Medical applications,
FibreOptics: Principle and propagation of light in optical fibres, Numerical aperture and acceptance angle and attenuation, Types of optical fibres (refractive index), Bending losses - Attenuation, dispersion, bending, Fibre optical communications system (Block diagram), Applications.

UNIT2 - CRYSTALLOGRAPHY & ADVANCED ENGINEERING MATERIALS
Crystallography: Crystal Physics - Lattice - Unit cell - Bravais lattice - Calculation of number of atoms per unit cell - Atomic radius - Coordination number - Packing factor for simple cubic, body centered cubic, face centered cubic, Bragg’s law.

Nanomaterials: Introduction, basics of nanomaterials, Preparation of nanomaterials: Ball milling, chemical vapour deposition method, sol-gel method, properties of nanomaterials, carbon nanotubes, Applications of nanomaterials.

UNIT3 - MAGNETIC AND SUPERCONDUCTING MATERIALS
Superconductivity: Properties, Critical Magnetic field, Meissner effect, Type-I and Type-II Superconductors, BCSTheory of Superconductivity (qualitative), Applications - SQUIDS, Magnetic levitation.

UNIT4 - ACOUSTICS OF BUILDINGS AND ULTRASONICS
Acoustics: Classification of Sound, Decibel, Reverberation, Reverberation time, Sabine’s formula - Derivation using growth and decay method, Absorption coefficient and its determination - factors affecting acoustic of buildings and their remedies.

Ultrasonics: Production of Ultrasound by Magnetostriiction and Piezoelectric methods - acoustic grating, Medical applications - Sonogram.

UNIT5 - QUANTUM PHYSICS
Properties of Matter waves, G.P. Thomson experiment, Schrödinger’s wave equation, Time Independent and Time-dependent equations, Physical significance of wave function, Particle in a one-dimensional box.

**UNIT 6 – METALS AND SEMICONDUCTING MATERIALS**


**Semiconductors:** Introduction, intrinsic and extrinsic semiconductors, direct and indirect semiconductors, carrier concentration of intrinsic and extrinsic semiconductors, electrical conductivity in semiconductors, Hall effect, Light Emitting Diode (LED), Photo Conductors and Solar Cell.

**Text books:**


**References:**

3. Solid State Physics by A. J. Dekkar
8. Physics of Semiconductor device, SC-SZC.

List of References:
1. Engineering Physics Lab manual by Dr. P. Mohan Babu, Ph.D
3. Laboratory Manual cum Record for Engineering Physics by Dr.Y. Aparna, Dr. K. Venkateswararao
Course Objectives:

The students should be made to:

- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudocode or draw flowcharts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures & unions in C.
- Comprehension of file operations

Course Outcomes:
At the end of the course, the student should be able to:

- Design C Programs for problems.
- Write and execute C programs for simple applications

UNITIC PROGRAMMING BASICS

UNITICTOKENS, DECISIONMAKING AND CONTROL STATEMENTS

Constants, Variables, Identifiers, DataTypes and sizes, Arithmetic, relational and logical operators, Increment and decrement operators, conditional operator, Assignment operator, and Bit-wise operators, Expressions using operators in C, Type Conversions, Decision Making—if, if-else, nested if-else, else-if-ladder, switch, Looping statements—while, do-while, for, Break, continue, goto statements-solvingsimple scientific and statistical problems.

UNITIIARRAYS AND STRINGS

Arrays—Definition, Declaration, Initialization, Storing and accessing elements, One dimensional, Two dimensional arrays and Multidimensional arrays. Strings—Definition, Declaration, Initialization, Storing and accessing, String operations .String Arrays. Simple programs—matrix operations.

UNITIVFUNCTIONS AND POINTERS

Function—Definition of function, Types of functions—predefined, user defined Recursion, Passing one dimensional and two dimensional arrays to functions.


UNITIVSTRUCTURES AND UNIONS

Structure—definition, declaration, Initialization, accessing structure, Nested
structure, arraysofstructure, structure and functions, structure and pointers, self-referential structure.

Union-definition, declaration, Initialization, accessing Union, Nested Union Programs using structures and Unions— Storage classes, Pre-processor directives.

UNITVIFILEHANDLING

Input and output-concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs

TEXTBOOKS:


REFERENCES:

• Pradip Dey, Manas Ghosh, “Fundamentals

Web links:
• http://www.w3schools.in/c/intro/
ENGINEERINGGRAPHICS
I Year –I Sem

Course Objectives:

• To develop in students, graphic skills for communication of concepts, ideas and design of engineering products
  • To expose them to existing national standards related to technical drawings.

Course Outcomes:

Upon Completion of the course, the student will be able to:

• Understand the basic concepts of Engineering graphics.
  • Learn about geometrical constructions for Engineering applications.
  • Draw the engineering scales, curves.
  • Understand the orthographic projections of points, lines and planes.
  • Draw the projections of solids.
  • Prepare isometric projection of solids.

CONCEPTS AND CONVENTIONS

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I – PLANECURVES AND SCALES
Basic Geometrical constructions, Curves used in engineering practices: Conics–Construction of ellipse, parabola and Hyperbola by generalmethod–Drawing of tangents and normal to the above curves, Scales: Construction of plane, Diagonal and Vernier scales.

UNIT II – PROJECTION OF POINTS AND LINES
Orthographic projection-principles-Principal planes-First angle projection- projection of points. Projection of straight lines(only First angle projections) parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane

UNIT III – PROJECTION OF LINES
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT IV- PROJECTION OF PLANE SURFACES
Projection of planes (polygonal and circular surfaces) perpendicular/parallel to one plane &inclined to other principal plane; inclined to both principle planes.

UNIT V–PROJECTION OF SOLIDS
Projection of solids like prisms, pyramids, cylinder, cone when the axis is inclined to one of the principal planes.

UNIT VI–ISOMETRIC PROJECTIONS
Principles of isometric projection – isometric scale – Isometric projections of lines, planes and simple solids - Prisms, pyramids, cylinders, cones.

TEXTBOOK:

REFERENCES:

Web links:-
• https://en.wikipedia.org/wiki/Engineering_drawing
• www.engineeringdrawing.org
• www.nptel.ac.in/courses/112103019/
OBJECTIVES:
1. To create an awareness on professional ethics and Human Values.
2. To create an awareness on Engineering Ethics and Human Values.
3. To Understand Social Responsibility of an Engineer.
4. To appreciate ethical dilemma while discharging duties in Professional life.
5. To identify the core values those shape the ethical behavior of an engineer.
6. To appreciate the rights of others.

OUTCOMES:
After completion of this course students should be able to:
1. Understood the core values that shape the ethical behavior of an engineer
2. Expose awareness on professional ethics and human values.
3. Know their role in development of Society and Public safety.

1. HUMAN VALUES

2. ETHICS
Valuing Time – Co-operation – Commitment. – Living Peacefully – Courage – Civic Virtue – Self Confidence vs over Confidence – Respect for Others.

3. ENGINEERING ETHICS

4. ENGINEERING AS SOCIAL EXPERIMENTATION:
Social Responsibility - Engineering as experimentation -
engineers as responsible experimenters - codes of ethics – Learning from the past, Conscientiousness - Code of Ethics – AIEEE, ASME, IEEE

5. SAFETY, RESPONSIBILITIES AND RIGHTS

6. GLOBAL ISSUES

TEXT BOOKS
4. Jayshree Suresh, B. S. Raghavan “Human Values and Professional Ethics” S. Chand & Company Ltd, Ramnagar, New Delhi

REFERENCES
ADVANCE NUMERICAL ABILITY SKILLS

1 Year –I Sem

Course Objectives:
To enhance the Quantitative and logical abilities of the students by acclimatizing them with the various analytical techniques.

Course Outcomes:
Students are able to Acquire Quantitative and logical abilities to solve various analytical techniques.

1. SPEED MATHS: Square & Square Roots, Cubes & Cube Roots, Multiplication Tips, Division Rules, Decimal Fractions, Simplification.

2. CLOCKS: Mirror image, Find out angle b/w given time, Find out time when angle is given, Placement problems.


5. NUMBER SERIES: Number series, Letter series, Series on difference, Series on multiplication, Series on squaries, cubes, and Placement problems.

6. ANALOGY: Number analogy, Letter analogy, Analogy on difference, Analogy on multiplication, Analogy on squares, cubes, Placement problems.

8. DICE: Concept Of Dice, Problems On Dice.

9. NUMBERS SYSTEM: Basics of Number system, Types of numbers, To find out number of factors, Concept of recurring decimal fractions, Fractions comparisons, Concept of LCM, Concept of HCF, Relation between LCMS & HCF, Concept of unit digit, Vbodmas concept, Placement 0problems.


11. AREA: Triangles, Quadrilaterals, Square, Rectangle, Rhombus, Trapezium, Placement problems.

REFERENCES

ENGLISH LANGUAGE COMMUNICATIONSKILLSLAB-I

I B.Tech-ISem

Objectives

- To improve the students’ fluency in English and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.

- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.

- To develop experience and confidence in one's presentational skills and JAM sessions.

Learning Outcomes

Students will be able to

1. Analyze formal and informal situations and interact with people.
2. Shed their inhibition and take active part in different speaking activities.
3. Compare their pronunciation with Received Pronunciation and use it appropriately.
4. Describe simple experiences with suitable points for JAM, Oral Presentations etc.
5. Attain Speaking skills with clarity and confidence which in turn enhances their employability skills.
6. Evaluate their ability in using the language for day to day conversation.

UNIT1
A. Greeting and Introductions
B. Pure Vowels

UNIT2
A. Asking for information and Requests
B. Diphthongs

UNIT3
A. Invitations
B. Consonants

UNIT4
A. Commands and Instructions
B. Accent and Rhythm

UNIT5
A. Suggestions and Opinions
B. Intonation
TextBook: “Strengthen your Communication Skills” Part-A
By Maruthi Publications

PRESCRIBED SOFTWARE: K-Van Solutions

REFERENCES:

ENGINEERING PHYSICS LAB

I-Year I-Sem

LAB OBJECTIVE
This course enables the students to:

➢ To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

COURSE OUTCOMES:
Engineering Physics: After completion of the course, a successful student will be able to:

➢ Acquire hands on experience on optics, electrical, electronics and Modern Physics experiments.
➢ Utilize basic Physics concepts for practical applications such as working components like capacitors, diodes and transistors.
➢ To get the depth in knowledge about the Lasers and its applications in various fields.
➢ Test optical components using principles of interference and diffraction of light.

LIST OF EXPERIMENTS
1. Determination of wavelength of laser light by diffraction phenomenon.
2. Determination of Acceptance angle and Numerical aperture in an optical fiber.
3. Determination of wavelengths of mercury spectrum using diffraction grating.
5. Determination of band gap of a semiconductor.
7. Study the horizontal component of Earth’s magnetic field using Stewart - Gee’s method.
8. Determination of acceleration due to gravity using Compound Pendulum.
10. Determination of Hall coefficient, mobility and carrier concentration using Hall effect.
12. Determination of frequency of tuning fork by using Volume resonator.

List of References:
1. Engineering Physics Lab manual by Dr. P. Mohan Babu, Ph.D
3. Laboratory Manual cum Record for Engineering Physics by Dr.Y. Aparna and Dr. K. Venkateswararao V.G.S Techno Series.
Course Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear and nonlinear data structures such as lists, stacks, queues, trees, and graphs.

Course outcomes:

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

- Design C Programs.
- Write and execute C programs for simple applications.

Exercise 1

- Write a C program to convert temperature from Fahrenheit to Celsius.
- Write a C program to calculate the area of a triangle using the formula:
  \[ \text{area} = \frac{1}{2} (s(s-a)(s-b)(s-c)) \]
  where \( s = \frac{(a+b+c)}{2} \).
- Write a C program to swap two numbers without using a temporary variable.

Exercise 2
• Write a C program to find the largest of three numbers using ternary operator.

• Write a C program to find the roots of a quadratic equation.

• Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 3

• Write a C program to find the sum of individual digits of a positive integer

• Write a C program to find the given number is palindrome number or not

• Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user. **Exercise 4**

• Write a C Program to print the multiplication table of a given number n upto a given value, where n is entered by the user.

• Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.

• Write a C Program to check whether the given number is Armstrong number or not.

**Exercise 5**

• Write a C program to generate the first n terms of the sequence Use the summing series method to compute the value of SIN(x), COS(x)
• Write a C function to generate Pascal’s triangle
• Write a C program to implement a liner search.

**Exercise 6**

• Write a C program to perform addition of two input matrices
• Write a C program to perform multiplication of two input matrices

**Exercise 7**

Write C programs for the following string operations without using the built-in functions
• to concatenate two strings
• to copy a string to another string
• to compare two strings

**Exercise 8**

Write C programs for the following string operations without using the built-in Functions—
• to find the length of a string
• to find whether a given string is palindrome or not

**Exercise 9**

• Write C programs illustrating call by value and call by reference concepts
• Write a C program to interchange the largest and smallest numbers in the array.

Exercise 10

Write a C program that uses both recursive and non-recursive functions for the following:

• To find the factorial of a given integer
• To find Fibonacci sequence

Exercise 11

• Write a C program to implement the array of the structure and arrays within the structure

• Write a C program to compare two arrays using pointers

Exercise 12

Examples which explore the use of structures, unions and other user-defined variables

Exercise 13

• Write a C program which copies one file to another.

• Write a C program to count the number of characters and number of lines in a file.

• Write a C program to get two files into a third file. The names of the files must be entered using command line arguments.

Web Links:
• http://www.c4learn.com/
• http://www.programmingsimplified.com/c-program-examples
Course Objectives:

- To provide expertise in language and proficiency to engineering professionals.
- To evolve indigenous ways of overcoming language barriers.
- To train the students to be good at job skills.
- To use basics of grammar in LSRW skills.
- To acquire the ability to write essay writing, report and curriculum vitae.
- To develop the creativity of the students related to verbal ability and reasoning or fluency of language.
- To develop the ability of understanding of other subjects.
- To develop the mastery of language for expressing his/her ideas, feelings and experiences.
- To develop the ability of evaluation and analysis of language components.

Course Outcomes:

Students will be able to….

- Identify and apply writing process principles to various assignments.
- Prepare and design their resume and face interviews with confidence.
- Analyse and present their views in group discussions effectively.
- Design the format/s of curriculum vitae and types of reports.
Apply study strategies including underlining, taking notes and outlining.
Evaluate and Analyze language components.

Unit-1 Energy

Renewable And Non-Renewable Sources- Wind Energy, Nuclear Energy: Idioms, Listening and rewriting, Debate, Role play, Conversation, Essay writing, Modals, Preparing summary, Group discussion, Listening, Speaking, Reading and Writing activities.

VOCABULARY: Units from 10 to 12 - Word families in language - http://www.englishvocabularyexercises.com/academic-word-list/ (sub list exercises)


Unit-2: Grammar and Composition - from 46 to 70: Question words, common verbs, plurals, countable and uncountable nouns etc. English Grammar Practice: http://ilsclasses.com/Essential%20Grammar%20in%20Use.pdf

Unit-3: Homi Jehangir Bhaba- Trail Blazers. - Orient Black Swan Pvt. Ltd. Publishers

VOCABULARY: Units from 13 to 15: Word families in language - http://www.englishvocabularyexercises.com/academic-word-list/ (sub list exercises)

Unit-4: Engineering Ethics

Challenger disaster-Protection from Natural calamities:
Vocabulary, Creative writing, Fixed expressions, Accents, Making posters, Direct and indirect speech, Developing creative writing skills, Report writing, Listening, Speaking, Reading and Writing activities.

VOCABULARY: Units from 16 to 18-
http://www.englishvocabularyexercises.com/academic-word-list/ (sub list exercises)

Reading Comprehension Module -3: Metal Detectors-

Unit-5: Grammar and Composition- from 71 to 90: articles, determiners, pronouns, adjectives etc. from English Grammar Practice:

Unit-6: Getting Job-Ready

SWOT Analysis- Preparing for Interviews: Vocabulary, Discourse markers, Telephone skills, Curriculum vitae, Phrasal verbs, Connectives, Problem-solving, Application letters, Interviews-telephone


Prescribed Books and References

Main Reader: Mindscapes-English for Technologists and Engineers- Orient Black Swan Pvt. Ltd. Publishers
Supplementary Reader: Trail Blazers. - Orient Black Swan Pvt. Ltd. Publishers

English Grammar Practice:

Vocabulary-
http://www.englishvocabularyexercises.com/academic-word-list/
(sub list exercises)

REFERENCES:


   a. Cengage, Mason USA. 2007
Course objectives:

- To provide students with a solid foundation in mathematical fundamentals such as multiple integrals, Eigen vectors, vector differentiation and integration required for different branches of engineering
- To acquaint the students with principles of mathematics through Partial Differential Equations, that serves as an essential tool in several applications

Learning Outcomes:
Students will be able to

- Solve the linear system of equations encountered in various engineering problems and use the concepts of Eigen values and eigenvectors in Engineering problems.
- Apply the knowledge of multiple integrals in various engineering problems
- Use vector calculus in electromagnetic fields, gravitational fields and fluid flow problems
- Compute Line integral, Surface integral and Volume integral and correlate them with the applications of Stokes, Greens and Divergence Theorems.
- Formulate and solve linear and nonlinear partial differential equations
- Apply the knowledge of solving higher order Partial differential equations with boundary conditions like heat, wave, and Laplace’s equations.

UNIT I Linear systems of equations, Eigen Values & Eigen Vectors: Rank-Echelon form, Normal form – Solution of Linear System of Equations – Homogeneous and Non Homogeneous linear system of equations
Eigen values and Eigen vectors: Eigen values - Eigen vectors– Properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem

UNIT II Multiple integrals: Double and triple integrals – change of variables – Change of order of Integration

UNIT III Vector Differentiation: Gradient- Normal vector to a level surface - Angle between normal vectors- Divergence- Solenoidal vector point function- Curl– Irrotational vector point function- Laplacian and second order operators -Vector identities

Application: Equation of continuity, potential surfaces


Application: work done by a Force, Flux

UNIT V First order Partial differential equations: Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equations and nonlinear (standard type) equations

UNIT VI Higher order Partial differential equations: Solutions of Homogeneous Linear Partial differential equations of higher order with constant coefficients- Method of separation of Variables

Applications: One- dimensional Wave, Heat equations.

TEXT BOOKS:

REFERENCE BOOKS:
OBJECTIVES:
- To make the student acquire sound knowledge of second law of thermodynamics and secondlaw based derivations of importance in engineering applications in all disciplines.
- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- Principles of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials.
- Preparation, properties and applications of engineering materials.
- To make the students conversant with basics of polymer chemistry.
- To develop an understanding of the basic concepts of nano materials, their properties and applications.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels

TOTAL (L: 48+T: 16): 64 PERIODS

OUTCOMES:
- Learn the mode by which potable water is produced through the processes of screening, aeration, coagulation and flocculation, sedimentation, filtration and disinfection, Softening methods of water and desalination process.
- Identify an oxidation – reduction (redox) reaction based on changes in oxidation numbers across the chemical change & to describe fully the relationship between cell potential and the equilibrium constant, the basic principles of battery design corrosion control methods.
Enrich about the conventional energy resources and their effective utilization, to acquire the knowledge of modern energy conversion technologies, To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively.

Identify the repeat units of particular polymers and specify the isomeric structures which can exist for those repeat units, estimate the number- and weight-average molecular masses of polymer samples given the degree of polymerization and mass fraction of chains present, describe the role of rubber-toughening in improving the mechanical properties of polymers

State the First Law and to define heat, work, thermal efficiency and the difference between various forms of energy, and thermo chemical reactions

Understand the fundamental principles of nanotechnology and various methods of synthesis ,properties and their application to biomedical engineering and other fields.

UNIT I – WATER TECHNOLOGY  8 + 3

UNIT II – ELECTROCHEMISTRY AND CORROSION  8 + 3
Electrochemical cell. Batteries: Primary cells (dry cells) and secondary cells (lead-Acid cell, Ni-Cd cell). Applications of batteries.
Corrosion- causes- factors- types chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control – material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method. Electroplating of Copper and electroless plating of nickel.
UNIT III – CHEMISTRY OF COMBUSTION  8 + 3

UNIT IV –POLYMER CHEMISTRY     8 + 3

UNIT V – CHEMICAL THERMODYNAMICS  8 + 3
Introduction, terminology of thermodynamics, first law of thermodynamics, Joule Thomson effect, enthalpy, Hess’s law of constant heat summation, heat capacity, second law of thermodynamics, entropy, free energy, Gibbs Helmholtz equation, Clausius-Clapeyron equation; Maxwell relations–Van’s Hoff isotherm.-isochore.

UNIT VI – NANO CHEMISTRY     6 + 3
Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties, nanotube (CNT). Synthesis: chemical vapour deposition, laser ablation; applications.

TEXT BOOKS:


REFERENCES:
4. B.S Murthy, P.Shankar, Baldev Raj, B.B Rath and james Murday
Course objectives:

- This course will emphasize the numerical methods that are used for solving different kinds of problems occurring in engineering and technology
- To gain the knowledge of Laplace Transforms, Fourier transforms, Z-transforms and their inverse transforms.

LEARNING OUTCOMES:

Students will be able to

1. Apply numerical techniques for solutions of Algebraic, transcendental and ordinary differential equations.
2. Understand the different numerical methods for interpolation
3. Solve differential equation using numerical methods
4. Apply Laplace transforms to solve ordinary differential equations arising in engineering problems
5. Find the Fourier transform and the inverse Fourier transform of a function
6. Use Z–transforms to find solutions of difference equations

UNIT I Solution of Algebraic and Transcendental Equations:

UNIT II Interpolation: Introduction- Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton’s formulae for interpolation– Interpolation with unevenly spaced points – Lagrange’s Interpolation formula

UNIT IV Laplace transforms: Laplace transforms of standard functions - Shifting Theorems, Transforms of derivatives and integrals – Unit step function – Dirac’s delta function – periodic function -


UNIT VI Z-transform: Introduction – properties – Damping rule – Shifting rule – Initial and final value theorems - Inverse z transform - Convolution theorem

Applications: Solution of difference equations.

TEXT BOOKS:

REFERENCE BOOKS:
4. DEAN G. DUFFY, Advanced engineering mathematics with MATLAB, CRC Press
Course Objectives: To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

Course outcome:

- Ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.

- Ability to analyse the forces in any structures.

- Ability to solve rigid body subjected to dynamic forces.

UNITI—INTRODUCTION TO MECHANICS


UNITII—EQUILIBRIUMOF SYSTEM OF FORCES

UNIT III – FRICTION

UNIT IV – CENTROID & CENTER OF GRAVITY
Centroids and centre of mass – Centroids of lines and areas – Rectangular, circular, triangular areas by integration – T section, I section, – Angle section, Hollow section by using standard formula – Theorems of Pappus – center of gravity of plane area sand composite areas

UNIT V: MOMENT OF INERTIA

UNIT VI – KINETICS OF PARTICLES

TEXTBOOKS:


3) N.H. Dubey, Engineering Mechanics (in SI units): Statics and

**REFERENCES:**


**WebLinks:**


3. www.nptel.ac.in/courses/112103109

4. www.iitg.ac.in/sgg/me101.html
Course Objectives

- To study the concepts of passive elements, types of sources and various network reduction techniques.
- To analyse the electrical circuits using mesh and node analysis.
- To understand the applications of network topology to electrical circuits.
- To understand the behaviour of RLC networks for sinusoidal excitations.
- To study the performance of R-L, R-C and R-L-C circuits with variation of one of the parameters and to understand the concept of resonance.
- To understand the applications of network theorems for analysis of electrical networks.

Course Outcomes

The students are able to solve

- Various electrical networks in presence of active and passive elements.
- The electrical circuits using mesh and nodal analysis techniques.
- Electrical networks with network topology concepts.
- Any R, L, C network with sinusoidal excitation.
- Any R, L, C network with variation of any one of the parameters i.e R, L, C. and f.
- Electrical networks by using principles of network theorems

Unit - I BASIC CIRCUIT CONCEPTS

Circuit elements, active, passive, unilateral, bilateral, lumped, distributed, linear, nonlinear, time variant & time invariant elements, Voltage and Current sources – Independent and dependent sources, source transformation, ohms law,
Kirchhoff’s laws, star-to-delta or delta-to-star transformation, network reduction techniques – series, parallel, series parallel networks, Numerical problems.

UNIT-II: NETWORK ANALYSIS
Basic definitions of Node, Path, Loop, Branch - Nodal analysis and super node concept – Mesh analysis and super mesh concept, Numerical problems with dependent and independent sources.

UNIT -III NETWORK TOPOLOGY

UNIT - IV STEADY STATE AC ANALYSIS
Periodic wave forms – average and effective values of different wave forms, Form factor and crest factor, Phase and phase difference – phase notation, Response of R, L and C elements for sinusoidal excitation, Steady state analysis of RL, RC and RLC circuits for sinusoidal excitation, Phasor diagrams, Concept of reactance, impedance, suscectance and admittance, Active & reactive power, Power factor, power triangle, Numerical problems.

UNIT – V RESONANCE & LOCUS DIAGRAMS
Series and parallel Resonance, Half power frequencies, Bandwidth, Q factor, Relation between – Half power frequencies, Bandwidth, Q factor, Numerical problems..
Locus diagrams of RL, RC & RLC series circuits,Locus diagrams of parallel circuits, Numerical problems of RL, RC & RLC series and parallel circuits,..

UNIT –VI NETWORK THEOREMS
Superposition and Reciprocity theorems, Thevenins and Norton’s theoremsMaximum power transfer theorem, Compensation theorem, Millman’s theorem and Tellegen’s theorem (without proof), Numerical problems.
TEXT BOOKS:
4. B. Subramanyam, Electrical Circuit analysis, IK publications, 2006

REFERENCE BOOKS:

WEB LINKS:
1. elearning.vtu.ac.in/
2. nptel.ac.in/
3. www.allaboutcircuits.com › ... › DC Network Analysis
MENTAL ABILITY AND LOGICAL REASONING SKILLS
I Year –II Sem

Course Objectives:
➢ To enhance the Quantitative and logical abilities of the students by acclimatizing them with the various analytical techniques.

Course Outcomes:
➢ Students are able to Acquire Quantitative and logical abilities to solve various analytical techniques.

1. SIMPLE INTEREST: Basic concept, Basic problems, Placement Problems.

2. COMPOUND INTEREST: Basic concept, Basic problems, Placement Problems.

3. PERMUTATIONS: Concept of factorial notation, Concept of permutations, Problems on numbers, Problems on letters, Problems on digits, Placement problems.

4. COMBINATIONS: Concept of combinations, P & C relations, Problems on numbers, Problems on letters, Problems on digits, Placement problems.

5. PROBABILITY: Concept of experiment, Random experiment, Rolling an unbiased dice, Tossing a friar card, Drawing a card from pack of cards, Placement problems.


7. BLOOD RELATIONS: Concept of blood relations, Deciphering jumbled up descriptions, Relation puzzle, Coded relations, Placement problems.
8. PUZZLE TEST: Classification Type, Seating /Placing Arrangements, Placement Problems.


10. CODIND- Decoding: Letter Coding, Direct Letter Coding, Number /Symbol Coding, Matrix Coding, Placement Problems.

11. ANALYTICAL REASONING: Counting Figures, Placement Problems.

12. RACES: Basic concept OF RACES, Basic problems ON RACES, Placement problems.

13. SEATING ARRANGEMENTS: Row seating arrangement, Circular seating arrangement, Placement problems.

14. VOLUME AND SURFACE AREA: Cube, Cylinder, Cone, Sphere, Hemisphere, Placement problems.

15. VENN DIAGRAMS: Two diagrams, three diagrams, four diagrams, Placement problems.

REFERENCES
ESSENTIALS IN ‘C’

I Year –II Sem

Course Objectives:

➢ To enhance the problem solving capabilities of the student using C Language by means of writing efficient, maintainable, and portable code.

Course Outcomes:

➢ Students are able to acquire problem solving and logical abilities with examples and applications using C language basics.

Module 1

LinuxIDE , Programming Paradigms, Basic Syntax and Semantics in C, Overview of Conditional statements and iterative control structures with suitable example programs, Type casting, Assignment operations.

Module 2

Arrays operations: passing arrays to function, Application of Arrays, string, character manipulations. Sorting – Bubble, Selection, Insertion. Strings and string operations without using built-in functions, array of strings, string and character functions (string manipulation function and character manipulation functions).

Module 3

Simple I/O, Functions: Introduction, function call, Classification of Functions, return statement, parameter passing to functions, Passing Functions to Functions, scope of variables,
storage classes, Recursive functions, types of recursion, Linear Recursion, Tail Recursion, Binary Recursion, Multiple Recursion.

Module 4

Pointer expressions, NULL and Generic pointers, pointers and strings, difference between array name and pointer, Passing arrays to functions, Array of pointers, function pointers, pointer to pointers, malloc(), calloc(), realloc(), free(). Command line arguments. drawbacks of pointers.

Module 5

Structures: Overview, Arrays with in Structures, pointers to structures Unions: overview, Bit fields. TypeDef, arrays of union variables, union within structures, structures within union, enum, Macros, creating reports using structures.

Module 6

Types of files, File descriptors, Low level I/O, error handling during file operations, accepting command line arguments, functions for selecting a record randomly, remove and renaming the file, creating a temporary file.

REFERENCES

COMMUNICATION SKILLS DEVELOPMENT
I Year –II Sem

Module -1 Self Introduction-1: Name, Place, about parents, educational qualification, achievements, accomplishments, hobbies, goal, etc

Module -2 Oral presentations-1: Presentation tips and do's and don'ts, Oral Presentation and its Analysis

Module -3 Oral presentations-2: Oral Presentation and its Analysis

Module -4 Reading skills: Reading types, SQR3 technique, Reading a news from Newspaper and its comprehension

Module -5 Verbal ability: Synonyms and Antonyms.

Module -6 Describing Object-1: Describing Objects in terms of its color, shape, size, weight, properties etc. and its analysis

Module -7 Describing Object-2 : Describing Objects in terms of its color, shape, size, weight, properties etc. and its analysis

Module -8 - Oral presentations-3: Oral Presentation and its Analysis

Module -9 Listening skills: TOFEL Listening topic “Administration office and Application for Parking” with Listening tips and Analysis

Module -10 Oral presentations-4: Oral Presentation and its Analysis

Module -11 Impromptu Speech: Impromptu Speech tips, Activity and its analysis
Module -12 Oral presentations-5: Oral Presentation and its Analysis
ENGLISH LANGUAGE COMMUNICATIONSKILLS LAB-II
IB.Tech-IISem T P C
0 4 2
SEMESTER-II-ADVANCED COMMUNICATIONSKILLS

Objectives

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills.

- To initiate them into greater use of the computer in resume preparation, report-writing, format-making etc.

- To train the students to attain the ability to give impromptu speeches and JAM sessions.

- To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required ability to face computer-based competitive exams such as GRE, TOEFL, GMAT etc.

Learning Outcomes

Students will be able to

1. Analyze their skills and make use of them for their professional career.

2. Prepare and design their resume and face interviews with confidence.

3. Attain better understanding of nuances of English language through audio-visual experience and group activities.

4. Present their views in group discussions effectively.
5. Describe simple experiences with suitable points for JAM sessions, impromptu speech etc..

6. Speak at every opportunity and give presentations effectively.

UNIT 6 - Body language

UNIT 7 – Dialogues
Additional activity:
JAM-2 (Just A Minute)- https://freshersplane.com/career/jam-just-a-minute-topics-with-answers/
http://www.isb.edu/events/social-events/jam-just-minute

UNIT 8 – Interviews and Telephonic Interviews
Additional activity:
Self-introduction-2-

UNIT 9 – Group Discussions

UNIT 10 – Presentation Skills
Additional activity:
Impromptu Speech-

UNIT 11 – Debates
Text Book: “Strengthen your Communication Skills” Part-B by Maruthi Publications
PRESCRIBED SOFTWARE: K-Van Solutions
REFERENCES:


OBJECTIVES:
- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- To make the student acquire practical skills in the wet chemical and instrumental methods.
- To get knowledge about estimation of hardness, alkalinity.

OUTCOMES:
- The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.
- The students will be conversant with hands-on knowledge in the quantitative chemical analysis of soil and redox reactions.

LIST OF EXPERIMENTS
1. Determination of alkalinity in water sample
2. Determination of total, temporary & permanent hardness of water by EDTA method
3. Estimation of copper content of the given solution by EDTA method
5. Estimation of Zinc by using potassium ferrocyanide
6. Determination of DO content of water sample by Winkler’s method.
7. Determination of chloride content of water sample by argentometric method.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Conduct metric titration of strong acid vs strong base.
10. Potentiometric titrations of strong acid vs strong base
11. Estimation of Vitamin – C
12. Preparation of Phenol Formaldehyde resin

TOTAL: 30 PERIODS

REFERENCES:

ENGINEERING WORKSHOP & IT WORKSHOP

I-Year II-Sem

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0  0  4  2

ENGINEERING WORKSHOP:

Course Objective: To impart hands-on practice on basic engineering trades and skills.

Course outcomes: Ability to use the technique, skills and modern mechanical engineering tools necessary for the mechanical engineering practice.

Note: At least two exercises to be done from each trade.

Trade:

Carpentry
1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tennon Joint

Fitting
1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

Black Smithy
1. Round Rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square Headed Bolt

House Wiring
1. Parallel/ Series Connection of three bulbs
2. Stair Case wiring
3. Fluorescent Lamp Fitting
4. Measurement of Earth Resistance
TinSmith
y
1. TaperTray
2. SquareBoxwithoutlid
3. OpenScoop
4. Funne
I

ITWORKSHOP:

Objectives: Enabling the student to understand basic hardware and software tools through practical exposure

PC Hardware:

Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Troubleshooting Hardware and software – some tips and tricks.

Internet & World Wide Web:

Different ways of hooking the PC to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums. Awareness of cyber hygiene (protecting the personal computer from getting infected with the viruses), worms and other cyber attacks.

Productivity tools: Crafting professional word documents; excel spreadsheets, powerpoint presentations and personal web sites using the Microsoft suite of office tools
(Note: Student should be thoroughly exposed to minimum of 10 Tasks)

PCHardware:

**Task 1:** Identification of the peripherals of a computer.

To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

**Task 2 (Optional):** A practice on disassembling the components of a PC and assembling them to back to working condition.

**Task 3:** Examples of Operating systems - DOS, MS Windows. Installation of MS Windows on a PC.

**Task 4:** Introduction to Memory and Storage Devices, I/O Port, Device Drivers, Assemblers, Compilers, Interpreters, Linkers, Loaders.

**Task 5:** Hardware Troubleshooting (Demonstration):

Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

**Software Troubleshooting (Demonstration):** Identification of a problem and fixing the PC for any software issues

**Internet & Networking Infrastructure.**

**Task 6:** Internet and world wide web. **Search Engines & Netiquette:**
Students are enabled to use search engines for simple search, academic search and any other context-based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

**MS office**

**Task 7: MS Word Orientation:** Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in Word, converting documents while saving.

**Task 8: Creating project:** Abstract Features to be covered: - Formatting Styles, Inserting Table, Bullets and Numbering, Changing Text Direction, Cell Alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, and Paragraphs, water marking.

**Excel**

**Task 9:** Using spreadsheet features of EXCEL including the macros, formulae, pivot tables, graphical representations, Features to be covered: - Gridlines, Format Cells, Summation, autofill, Formatting Text
**Performance Analysis** - Features to be covered: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

**Power Point**

**Task 10:** Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes: - PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting – Images, ClipArt, Tables and Charts in PowerPoint.

**Task 11:** Focusing on the power and potential of Microsoft powerpoint. Help them learn best practices in designing and preparing powerpoint presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slideslotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.

**TEXTBOOK:**

Faculty to consolidate the workshop manuals using the following references

1. Computer Fundamentals, Anita Goel, Pearson

2. Scott Mueller’s Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
3. Information Technology Workshop, 3e, G Praveen Babu, M V Narayana BS Publications.


REFERENCE BOOK:

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu
Course objectives:
- To make the students understand the concepts of magnetic circuits.
- To make the students understand the concepts of poly phase circuits.
- To make the students understand the concept of transient analysis of A.C & D.C circuits.
- To make the students understand the concept various network parameters and their applications.
- To enable the students to digest the concepts of network functions.

Course outcomes:
At the end of the course Students are able to
- recognize the magnetic circuits.
- analyze the three- phase circuit parameters under balanced condition.
- estimate three- phase circuit parameters under unbalanced condition.
- apply the transient conditions to A.C and D.C circuits.
- determine different network parameters.
- identify the network functions.

UNIT - I  MAGNETIC CIRCUITS
circuit - Analysis of series and parallel magnetic circuits, Numerical problems.

UNIT - II POLYPHASE CIRCUITS
Generation of three Phase voltages, currents and power, phase sequence, Relation between Line & Phase quantities in Star and Delta Connection, Analysis of three phase balanced and unbalanced circuits with vector diagrams, Numerical problems.

UNIT - III DC TRANSIENT ANALYSIS
Introduction to transient analysis, initial conditions, transient response of Series RL, RC and RLC circuits, Solution using differential equation approach and Laplace transforms, Numerical problems.

UNIT - IV AC TRANSIENT ANALYSIS

UNIT - V NETWORK PARAMETERS
Network Parameters: Definition of Two port network, impedance parameters, admittance parameters, transmission parameters, hybrid, inverse hybrid parameters, interrelation between parameter sets, interconnection between parameters, reciprocity and symmetry concepts of two port network parameters, Numerical problems.

UNIT - VI NETWORK FUNCTIONS
Introduction, Driving point function, Transfer function, Poles & zeros of network function, restriction of pole zero location for a driving point and transfer functions, time
domain behaviour of pole and zero plot, graphical method for determination of residue- Numerical problems

TEXT BOOKS
4. B. Subramanyam, Electrical Circuit analysis, IK publications, 2006

REFERENCE BOOKS

Web Links:
• elearning.vtu.ac.in/P9/notes/06ES34/Unit1-KCV.pdf
• nptel.ac.in/courses/108102042/
• www.allaboutcircuits.com › ... › DC Network Analysis
Course Objectives:
- To study the working principles of DC machines along with the classification.
- To analyze no-load/load characteristics of DC machines.
- To study the starting and speed control methods of DC motors.
- To estimate the various losses taking place in DC machines and to study the different testing methods to arrive at their performance.

Course Outcomes:
At the end of the course Students are able to
- Explain the operation of DC generator and types
- Identify armature reaction and commutation concepts
- Analyze the characteristics and performance of DC generators.
- Describe the torque developed and performance of DC motors.
- Apply the speed control of DC motors
- Evaluate performance of the machine by conducting tests on DC machines.

UNIT – I DC Generators

UNIT – II Armature reaction and Commutation
Armature reaction – Cross magnetizing and de-magnetizing AT/pole –commutation Process – reactance voltage –
methods of improving commutation – Compensating windings – Interpoles.

UNIT – III Characteristics of D.C Generators and parallel operation

UNIT – IV D.C. Motors

UNIT -V Speed Control of D.C. Motors

UNIT –VI Testing of D.C. Machines
Brake test, Swinburne’s method, Hopkinson’s method, Field’s test for series machines, Retardation test, Separation of losses.

TEXT BOOKS:
1. Electrical Machines – P.S. Bimbra., Khanna Publishers
REFERENCE BOOKS

2. Electrical Machines by J.B.Guptha. S.K.Katania & Sons

Web Links:

- Ocw.mit.edu › ... › Electric Machines
- www.learnerstv.com/Free-engineering-Video-lectures-ltv705-Page1.htm
Course objectives:
- To learn fundamental concepts in the field of fluid mechanics and to get exposure about application of fluid mechanics in industry and field by means of studying the devices like pumps, turbines.

Course Outcomes:
- Able to know the importance, application and interrelationship of various properties of fluid.
- Able to understand the classification, components, function, and use of different types of pumps.

Part-A: Thermal Prime movers

UNIT-I: I.C ENGINES:
classification, working principles, Valve and port timing diagrams- air standard cycles- Engine systems line fuel injection, carburetion, ignition, cooling and lubrication-Engine performance evaluation

UNIT-II:
and output of Rankine cycle Analysis of simple Rankine Cycle and Re-heat Cycle.

**Steam Turbines:** Schematic Layout of steam power plant classiication of steam Turbines- Impulse Turbine and Reaction turbine - Compounding in Turbines- Velocity Diagrams for simple impulse and Reaction turbines- Work done & efficiency.

**UNIT-III:**
**Gas Turbines:** Simple gas turbine plant- ideal cycle, closed cycle-open cycle- Efficiency, Work ratio and optimum pressure ratio for simple gas turbine cycleedula cycle, analysis of simple cycle & cycles with inter cooling, reheating and regeneration.

**Part-B: Hydro Prime movers**

**UNIT-IV:**
**IMPACT OF JETS AND PUMPS:** Impulse momentum equation, impact of jet on a stationary and moving vanes (flat and curved). Pumps: Types of pumps, Centrifugal pumps: Main components, Working principle, Multi stage pumps, Performance and characteristic curves

**UNIT-V:**
**HYDRAULIC TURBINES:** Classification of turbines; Working principle, Efficiency calculation and Design principles for pelton wheel, Francis turbine and Kaplan turbines; Governing of turbines; performance and characteristic curves.

**UNIT-VI:**
HYDRO POWER: Components of Hydro-electric power plant: pumped storage systems, Estimation of water power potential; Estimation of load on turbines; load curve, load factor, capacity factor, utilization factor, diversity factor, load-duration curve, firm power, secondary power, prediction of load.

TEXT BOOKS:
1. Thermal engineering by Rajput, Laksluni publications
2. Thermal engineering by M.L.Mathur and F.S.mehata, jain Brothers

REFERENCE BOOKS:
2. Fluid Mechanics by R.K Bansal

Web links:
- nptel.ac.in/courses/112104118
- https://www.princeton.edu/.../fluids.html
Course Objectives:

- To find and implement scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth’s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

Course Outcomes:

The student should have knowledge on

- Understand the concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.
- Analyze the biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.
• Assess the various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
• Explain the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.
• Demonstrate the social issues both rural and urban environment and the possible means to combat the challenges.
• Identify and obtain the knowledge of environmental legislations of India and the first global initiative towards sustainable development.

UNIT I - ENVIRONMENT

• Definition, scope and importance of Environmental studies. Green buildings. 1998 and amendments-scheme of labeling of environmentally friendly products (Ecomark).

ECOSYSTEMS

• Concept of an ecosystem - structure and function of an ecosystem
• Producers, consumers and decomposers- Oxygen cycle and Nitrogen cycle - energy flow in the ecosystem - ecological succession processes
• Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).
UNIT 2 - BIO DIVERSITY

- Introduction to biodiversity definition: genetic, species and ecosystem diversity biogeographically classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, national and local levels; India as a mega-diversity nation
- Hot-spots of biodiversity - threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts –endangered and endemic species of India
- Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds field study of simple ecosystems pond, river, hill slopes, etc.

UNIT 3 - ENVIRONMENTAL POLLUTION

- Definition - causes, effects and control measures of:
  (a) Air pollution (Atmospheric chemistry-Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere -formation of smog, PAN, acid rain, oxygen and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission, Control of SO₂, NO, CO and HC)
  (b) Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance;
- Water quality parameters physical, chemical and biological; absorption of heavy metals - Water treatment processes.
- (c) Soil pollution – soil waste management: causes, effects and control measures of municipal solid wastes
- (d) Noise pollution
- (e) Thermal pollution
- (f) Nuclear hazards
- Role of an individual in prevention of pollution
- Pollution case studies
- Field study of local polluted site
- Urban / Rural / Industrial / Agricultural.

- **UNIT 4- NATURAL RESOURCES**
  - Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people
  - Water resources: Use and overutilization of surface and ground water, dams-benefits and problems
  - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies
  - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies
  - Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Carbon Trading. Energy Conversion processes
  - Biogas production and uses, anaerobic digestion; case studies
• Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification
• Role of an individual in conservation of natural resources
• Equitable use of resources for sustainable lifestyles.
• Field study of local area to document environmental assets river / forest / grassland / hill / mountain.

UNIT 5 - SOCIAL ISSUES AND THE ENVIRONMENT
• From unsustainable to sustainable development urban problems related to energy water conservation, rain water harvesting, watershed management resettlement and rehabilitation of people; its problems and concerns, case studies
• Role of non-governmental organization-environmental ethics: Issues and possible solutions, nuclear accidents and holocaust, case studies.
• The Biomedical Waste (Management and Handling), disaster management: floods, earthquake, cyclone and landslides. Public awareness.

UNIT 6 - HUMAN POPULATION AND THE ENVIRONMENT
• Population growth, variation among nations.
• Population explosion - family welfare programme.
• Women and child welfare -Environmental impact analysis (EIA)-GIS-remote sensing-role of information technology in environment and human health.
• Case studies.

TEXT BOOKS:
1. Environmental Studies by Erach Bharucha, 2nd edition, 2013, 14, universities press
3. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi

REFERENCES:
5. Environmental Studies by Piyush Malaviya, Pratibha Singh.

Web Links:
• http://www.sustainablebabysteps.com/kinds-of-environmental-pollution.html
• http://www.info.com/search?qcat=web&r_cop=search&cmp=2872&cb=39&qkw=conserving+biodiversity
• https://en.wikipedia.org/wiki/Natural_environment
• https://en.wikipedia.org/wiki/Environmental_impact_assessment
• http://forest.mtu.edu/kidscorner/ecosystems/definition.html
Course Objectives:

- To study the production of electric field and potentials due to different configurations of static charges.
- To study the properties of conductors and dielectrics, calculate the capacitance of different configurations and understand the concept of conduction and convection current densities.
- To study the magnetic fields produced by currents in different configurations, application of ampere’s law and the Maxwell’s second and third equations.
- To study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.
- To develop the concept of self and mutual inductances and the energy stored Self and Mutual inductance – determination of self-inductance of a solenoid and torrid 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.
- To study time varying and Maxwell’s equations in different forms and Maxwell’s fourth equation for the induced EMF.

Course outcomes:

At the end of the course Students are able to

- recognize electrostatic fields
• Determine capacitance, energy stored in dielectrics and get’s the concept of conduction and convection currents.
• Find magnetic field intensity due to current, the application of ampere’s law and the Maxwell’s second and third equations.
• Analyze the magnetic forces and torque produced by currents in magnetic field.
• Estimate self, mutual inductances and energy stored in the magnetic field.
• Reproduce time varying fields and get capacity to compute induced EMF.

UNIT – I
Electrostatics
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 – Potential gradient, Gauss’s law – Application of Gauss’s Law – Maxwell’s first equation.

UNIT – II
Conductors and Dipole
Laplace’s and Poisson’s equations, Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field, Behaviour of conductors in an electric field.

UNIT – III
Dielectric & Capacitance
Electric field inside a dielectric material, Polarization, Dielectric Conductor and Dielectric 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.

UNIT – IV
Magneto Statics
Static magnetic fields - Relation between magnetic flux, magnetic flux density and magnetic field intensity (MFI), Maxwell’s second Equation, Biot-Savart’s law, MFI due to a straight current carrying filament, circular wire, square loop and solenoid. Ampere’s circuital law and its applications - MFI due to an infinite sheet of current, a long current carrying filament, Point form of Ampere’s circuital law – Maxwell’s third equation.

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

UNIT – VI
Time Varying Fields
Time varying fields – Faraday’s laws of electromagnetic induction – Its integral and point forms – Maxwell’s fourth
equation, Statically and Dynamically induced EMF’s – Simple problems – Modification of Maxwell’s equations for time varying fields, Current density – conduction and Convection current densities – Ohm’s law in point form.

**TEXT BOOKS:**

**REFERENCE BOOKS:**

**WEB LINKS:**
1. nptel.ac.in/courses/117103065/
2. ocw.mit.edu
3. https://courses.cit.cornell.edu/ece303/Lectures/Lectures.htm
Course Objectives:
- The course intends to provide an overview of the Principles, operation and application of the analog building blocks like diodes, BJT, FET Etc for performing various functions.
- This course relies on elementary treatment and qualitative analysis and makes use of simple models and equation to illustrate the concepts involved.

Course outcomes:
At the end of the course the students will be able to:
- Understand the theory of semiconductor & PN junction diode.
- Know the basics of BJT & FET operation.
- Gain a thorough understanding of operation &characteristics of thyristors, rectifiers, MOSFET, amplifiers.

UNIT 1 - SEMICONDUCTOR PHYSICS:
Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; Generation and recombination of carriers; Poisson and continuity equations.

UNIT 2 - JUNCTION DIODE CHARACTERISTICS:
Open circuited P-N junction, Biased P-N junction, P-N junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence
on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

UNIT 3 – SPECIAL SEMICONDUCTOR DEVICES:
Zener Diode, Breakdown mechanisms, Zener diode applications, LED, Photo diode, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT: Construction, operation and characteristics of all the diodes is required to be considered.

UNIT 4 – RECTIFIERS AND FILTERS:
Rectifiers and Filters: Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms; Filters; Inductor filter, Capacitor filter, L- section filter, Π- section filter, Multiple L- section and Multiple Π section filter, comparison of various filter circuits in terms of ripple factors.

UNIT 5 – TRANSISTOR CHARACTERISTICS:
BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

UNIT 6– TRANSISTORBIASINGANDTHERMALSTABILIZATION:
Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in VBE, Ic, and
β, Stability factors, (S, S', S''), Bias compensation, Thermal runaway, Thermal stability.

**FET:** FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET. FET Biasing- methods and stabilization.

**TEXTBOOKS:**

**REFERENCES:**

**Web links:**
1. [www.nptel.ac.in](http://www.nptel.ac.in)
2. [http://ocw.mit.edu/courses/](http://ocw.mit.edu/courses/)
SKILL DEVELOPMENT (Soft Skills)  
(English essentials and aptitude)  
II B.TECH I SEM

Course Objectives:

- To provide expertise in language and proficiency to engineering professionals.
- To develop the mastery of language for expressing ideas, feelings and experiences.
- To develop the understanding about rules of grammar and their use in writing English.
- To enhance communication skills and train the students to be good at job skills.
- To enhance the Quantitative and logical abilities of the students by acclimatizing them with the various analytical techniques.

Course Outcomes:

Students are able to....

- Produce simple sentences and short paragraphs in response to readings.
- Apply writing process principles effectively.
- Increase confidence in their ability to read, comprehend, organize, and retain written information.
- Acquire Quantitative and logical abilities to solve various analytical techniques.

PART-1 - ENGLISH LANGUAGE LEARNING

UNIT-1:
ENGLISH LANGUAGE LEARNING: Auxiliary verbs, Positive and Negatives, Using suitable verbs, Never, Often, Questions with Do & Does, Have, Haven’t, Simple past and Past continuous.

QUANTITATIVE APTITUDE: Ratio, Types of Ratios, Inverse Ratio, Compounded Ratio, Proportion, Direct Variation, Indirect Variation, Mixed Variation, General problems on Ratios.

UNIT-2:
Simple past and Past continuous, Exercises wit yet, Have you ever, How long, Since and for, Present perfect, past participle, Future sentences.

QUANTITATIVE APTITUDE: Concept of Percentage, To express x% as a fraction, To express a/b as a Percent, values to percentages, Problems on numbers, Results on population, Results on depreciation, increase or decrease percent, General problems on percentages.

UNIT-3:
ENGLISH LANGUAGE LEARNING- Future Plans, questions with Would you like to..., let us..., filling blanks, How far, was and were, Question tags, Negative and Positive verbs.


UNIT-4:
ENGLISH LANGUAGE LEARNING – Exercises with WH questions, questions with Do you….and Using suitable verbs

QUANTITATIVE APTITUDE: Concept of Time & Work, men (or) women (or) boy model, men and women and boy model, Problems on Wages, Problems on Efficiency, pipes & cisterns, Concept of calendar, find out odd days, find the day of week, find the same calendar repeated, model problems on calendar.

UNIT-5:

ENGLISH LANGUAGE LEARNING - Using suitable verbs, Exercises with Prepositions (to, on, for), using get, make, have personal pronouns and possessive pronouns.

QUANTITATIVE APTITUDE: Concept of Time & Distance, Conversion of units, Problems on equal & un equal distances, Relative speed, Trains crosses pole, Trains crosses bridge, Trains crosses another Train, Trains crosses person sitting in another Train. Boats & streams.

UNIT-6:

ENGLISH LANGUAGE LEARNING – Plurals, Correction of sentences, Countable and uncountable nouns, articles, Demonstrative pronouns, some, no, any or none, nobody, anybody, nothing, somebody etc.

QUANTITATIVE APTITUDE: Concept of Average, Average on speeds, Average of Group ,Average of consecutive numbers, Problems on Averages, Concept of Mixtures and Alligations, Rule of Alligation, Problems on Mixtures.
REFERENCES:

Course Objectives:
- To draw the locus diagrams of a RLC network by varying one of the parameters.
- To verify the theorems on electrical networks both theoretically and practically.
- Practical verification of resonant condition in the given RLC network.
- Practical determination of the parameters of a two port network.
- Practical measurement of 3-phase power for balanced and unbalanced loads.

Course Outcomes:
The students are able to
- Use basic laboratory equipment and techniques to measure electrical quantities using laboratory test equipment such as multimeters, power supplies, signal generators, and oscilloscopes.
- Explain the concept of circuit laws and network theorems and apply them to laboratory measurements.
- Become proficient with computer skills (e.g., OrCAD Pspice and Capture) for the analysis and design of circuits. Develop technical writing skills important for effective communication.

PART-A: ELECTRICAL CIRCUITS: Any Eight of the Experiments from the following list are required to be conducted.
1) Verification of Thevenin’s and Norton’s Theorems
2) Verification of Superposition theorem and Maximum Power Transfer Theorem
3) Verification of Compensation Theorem
4) Verification of Reciprocity, Millmann’s Theorems
5) Locus Diagrams of RL and RC Series Circuits
6) Series and Parallel Resonance
7) Determination of Self, Mutual Inductances and Coefficient of coupling
8) Z and Y Parameters
9) Transmission and hybrid parameters
10) Measurement of Active Power for Star and Delta connected balanced loads
11) Measurement of Reactive Power for Star and Delta connected balanced loads
12) Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads

PART-B: PSPICE SIMULATION: Any two of the Experiments from the following are required to be conducted.

1) Simulation of DC Circuits
2) DC Transient response
3) Mesh Analysis
4) Nodal Analysis

NOTE
- PSPICE Software Package is necessary.
- Eight experiments are to be conducted from PART-A and any Two from PART-B

Web Links:
- www.jntumaterials.co.in/.../jntuk-btech-lab-manuals-for-ce-eee-mech.ht...
• engineeringinterviewquestions.com/lab-manuals-for-subject-wise-in-engi...
• https://gateselibrary.wordpress.com/lab-manuals/
Course Objectives:
- To import the practical knowledge on the performance and evolution methods of various internal combustion Engines, flow measuring equipment and hydraulic turbines and pumps.

Course Outcomes:
Student will able to
- Describe the various basic components of turbines and operating principles.
- Working principles of different gas turbines.
- Working principles of centrifugal and reciprocating pumps.

PART-A: THERMAL ENGINEERING LAB
- I.C.Engines valve/port timing diagrams
- Engine performance test on 4-stroke Diesel engine
- I.C.Engines performance test on 2-stroke petrol engine
- Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine
- Determination of PHP by retardation and motoring test on ic engine
- I.C.Engines heat balance on petrol/Diesel engines.
- Economical Speed test of an IC engine
- Study of boilers

SECTION-B: HYDRAULIC MACHINES LAB
• Impact of jets on vanes
• Performance test on Pelton wheel
• Performance test on Francis Turbine
• Performance test on Kaplan Turbine
• Performance test on Single Stage Centrifugal Pump
• Performance test on Reciprocating Pump
• Calibration of Venturimeter
• Calibration of Orifice meter
• Determination of loss of head due to Sudden Contaction in a pipeline
Course Objectives:
- To study the principle of operation and performance of single-phase transformers.
- To understand the methods of testing the single phase transformers.
- To understand the three phase transformer connections, tap changing methods and 3-phase to 2-phase transformation.
- Understand the concept of operation and performance of 3-phase induction motor.
- Determine the relation between torque and slip, performance of induction motor and induction generator.
- To understand the concept of starting and speed control of three phase induction motor.

Course Outcomes:
At the end of the course Students are able to
- Recognize the operation and performance of single phase transformer.
- Analyze the regulation, losses and efficiency of single phase transformer.
- Classify three phase transformer connections.
- Identify the operation of three phase induction motor.
- Determine the performance characteristics of three phase induction motor.
- Apply the different speed control and starting methods of three phase induction motor.
UNIT-I Introduction to Single-Phase Transformers

UNIT-II Testing of Transformers
OC and SC tests – Sumpner’s test –separation of losses - parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers.

UNIT-III Three phase Transformers
Polyphase connections – Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ - three winding transformers : tertiary windings-determination of Z_p, Z_s and Z_t – off load and on load tap changers – Scott connection.

UNIT-IV 3-phase Induction Motors
construction details of squirrel cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor current and p.f at standstill and during running conditions -Rotor power input, rotor copper loss and mechanical power developed and their inter relationship.

UNIT-V Characteristics and Testing of Induction Motors
Torque equation- expressions for maximum torque and starting torque – torque slip characteristics – equivalent
circuit – phasor diagram – double cage and deep bar rotors -
crawling and cogging-No load and blocked rotor tests- Circle
diagram for predetermination of performance-problems.

UNIT-VI Starting methods and Speed Control Methods
Methods of starting- Stator voltage control – frequency
control – Pole changing – cascade connection- Induction
generator-principle of operation.

TEXT BOOKS
2. P.S. Bhimbhra, ‘Electrical Machinery’, Khanna
3. Electrical Machines by J.B.Guptha. S.K.Kataria & Sons

REFERENCES
1. Performance and Design of AC machines – M.G Say
2. Theory of Alternating Current machines – Alexander
Lagnsdorf
3. A.C Commutator motor – Openshaw Taylor
4. Alternating Current machines – Puchstein & Lloyd

WEB LINKS
1. www.iannauniversity.com/.../ee2302-electrical-
machines-ii-lecture.html
2. nptel.ac.in/courses/108106072/
3. www.studynama.com/.../365-Electrical-machines-II-
ebook-pd...
Course Objectives:
- To study the principle of operation and function of different components of thermal, hydro and gas power stations.
- To study the principle of operation and function of different components of nuclear, solar and wind power stations.
- To study the concepts of different types of load curves and types of tariffs applicable to consumers.

Course Outcomes:
At the end of the course Students are able to
- Identify the different components of thermal power stations
- Recognize the different components of hydro and gas power stations
- State the different components of nuclear power stations
- Define the different components of solar power stations
- Cite the different components of wind power stations
- Analyze the economic aspects of power generation.

UNIT - I THERMAL POWER STATIONS
Selection of site, general layout of a thermal power plant showing paths of coal, steam, water, air, ash and flue gasses, ash handling system, Brief description of components: Boilers, Super heaters, Economizers, electrostatic precipitators steam Turbines : Impulse and reaction turbines, Condensers, feed water circuit, Cooling towers and Chimney.

UNIT-II HYDRO & GAS POWER STATIONS
Hydro Power Selection of Site, Classification, Layout, Description of Main Components.
Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only)

UNIT-III NUCLEAR POWER GENERATING SYSTEMS:
Nuclear Fission and Chain Reaction.- Nuclear Fuels.-Principle of Operation of Nuclear Reactor.-Reactor Components: Moderators, Control Rods, Reflectors and Coolants.- Radiation Hazards: Shielding and Safety Precautions.- Types of Nuclear Reactors and Brief Description of PWR, BWR and FBR.

UNIT-IV SOLAR Power Generation

UNIT-V WIND POWER GENERATING SYSTEMS
Role and potential of Wind Energy Option, Horizontal and Vertical Axis Wind Mills- Performance Characteristics-
Power- Speed & Torque- Speed Characteristics-Pitch & Yaw Controls - Power Electronics Application - Economic Aspects.

UNIT-VI ECONOMIC ASPECTS OF POWER GENERATION
Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, capacity factor, capacity, utilization and plant use factors, Costs of generation and their division into fixed, semi-fixed and running costs. Desirable characteristics of a tariff method, tariff methods: flat rate, block-rate, two-part, three -part, and power factor tariff methods, types of depreciation– Numerical Problems.

TEXT BOOKS:

REFERENCE BOOKS:

Web Links:
1. nptel.ac.in/courses/108105053/pdf/L- 2 (TB) (ET) % 20 ((EE) NPTEL ). pdf
3. www.rejinpaul.com/2013/.../10ee36-electric-power-generation-notes.htm...
PULSE AND DIGITAL CIRCUITS  
II B.TECH II SEM  

L T P C  
2 1 0 3

Course Objectives:  
The student will be made  
- To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor.  
- To analyze different types of Multi vibrators and their design procedures.  
- To Introduce to Time-base Generators and Principles of Synchronization and Frequency division.  
- To Understand Sampling Gates and to Design NAND and NOR gates using various logic families.

Course Outcomes:  
After going through this course the student will be able to  
- Design linear and non-linear wave shaping circuits.  
- Apply the fundamental concepts of wave shaping for various switching and signal Generating circuits.  
- Design different multivibrators and time base generators.

UNIT I: LINEAR WAVE SHAPING:  
High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.
UNIT II: NON-LINEAR WAVE SHAPING:
Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clippers.

UNIT III: MULTIVIBRATORS:

UNIT IV: Monostable Multi vibrator:

UNIT V: VOLTAGE TIME BASE Generators:
General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators - basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator.

UNIT VI: SYNCHRONIZATION AND FREQUENCY DIVISION & SAMPLING GATES:
Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals. Basic operating principles of sampling gates, Unidirectional and Bidirectional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates.

TEXT BOOKS:

REFERENCES:

Web links:
Course Objectives:
- To provide core competence in Analysis and design of circuits.
- To understand the basic digital logic fundamentals such as numbering system, binary codes and Boolean algebra.
- To minimize and simply the Boolean algebraic equation.
- To design the combinational and sequential circuits with basic logic gates and components.
- To draw the ASM Charts for both more and mealy machines.

Course Outcomes:
- Understand the basic digital logic fundamentals such as numbering system, binary codes and Boolean algebra.
- Able to design and implement the combination and sequential circuits.
- Develop the ASM Charts for both more and mealy machines.
UNIT - I : REVIEW OF NUMBER SYSTEMS & CODES: i) Representation of numbers of different radix, conversion from one radix to another radix, r-1’s compliments and r’s compliments of signed members, problem solving. ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9’s compliment code etc., iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

UNIT - II : MINIMIZATION TECHNIQUES: Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 6 variables, tabular minimization, problem solving (code-converters using K-Map etc.).

UNIT - III: COMBINATIONAL LOGIC CIRCUITS DESIGN : Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using
decoders and multiplexers, priority encoder, 4-bit digital comparator.

**UNIT – IV: INTRODUCTION OF PLD’s**: PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

**UNIT – V: SEQUENTIAL CIRCUITS I**: Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

**UNIT – VI: SEQUENTIAL CIRCUITS II**: Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Mealy to Moore conversion and vice-versa.

**TEXT BOOKS:**
2. Switching Theory and Logic Design by A. Anand Kumar
3. Digital Design by Mano PHI.

REFERENCE BOOKS:
1. Modern Digital Electronics by RP Jain, TMH.

Web links:
- https://www.smartzworld.com/notes/electromagnetic-waves-transmission-lines-emtl/
- http://nptel.ac.in/video.php?subjectId=117101056
- http://www.nptelvideos.in/2012/12/transmission-lines-and-em-waves.html
- http://freevideolectures.com/Course/2340/Electromagnetic-Fields
Course Objectives:

- To learn the concept of control systems and the mathematical modeling of physical systems.
- To determine the overall transfer function using block diagram algebra and signal flow graph techniques.
- To analyze the time response of first and second order systems and understand the concepts of proportional plus derivative and proportional plus integral controllers.
- To investigate the stability of closed loop systems using Routh’s stability criterion and the analysis by root locus method.
- To present the Frequency Response approaches for the analysis of linear time invariant (LTI) systems using Bode plots, polar plots and Nyquist stability criterion.

Course Outcomes:

- Ability to derive the transfer functions of physical systems.
- Ability to determine the overall transfer function using block diagram algebra and signal flow graphs.
- Ability to analyze time response specifications of second order systems and to determine error constants.
• Ability to estimate the absolute and relative stability of LTI systems using Routh’s s stability criterion and the root locus method.
• Ability to evaluate the stability of LTI systems using frequency response methods.
• Ability to develop polar and nyquist plots for determination of stability of LTI systems.

UNIT - I INTRODUCTION

UNIT - II TRANSFER FUNCTION REPRESENTATION
Block diagram algebra – Representation by Signal flow graph – Reduction using Mason’s gain formula, Transfer Function of DC Servo motor, AC Servo motor- Synchro transmitter and Receiver.

UNIT-III TIME RESPONSE ANALYSIS

UNIT - IV STABILITY ANALYSIS IN S-DOMAIN

UNIT – V FREQUENCY RESPONSE ANALYSIS-I
Introduction, Frequency domain specifications - Bode diagrams - Determination of Phase margin and Gain margin - Stability Analysis from Bode Plots, Determination of transfer function from the Bode Diagram.

UNIT – VI FREQUENCY RESPONSE ANALYSIS-II

TEXT BOOKS

REFERENCE BOOKS
4. “Modelling & Control Of Dynamic Systems” by Narciso F. Macia George J. Thaler, Thomson Publisher
WEB LINKS

1. nptel.ac.in/downloads/108103008/
2. ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-245-multivariable-control-systems-spring-2004/
3. elearning.vtu.ac.in/ME55.html
FOUNDATION ELECTIVES

PROBABILITY AND STATISTICS

II Year –II Sem

Course Objectives:
• Motivate in students an intrinsic interest in statistical thinking.
• Instil the belief that Statistics is important for scientific research.
• Provide a foundation and motivation for exposure to statistical ideas subsequent to the course.

Learning outcomes:
Student will be able to
• Interpret examples of methods for summarising data sets including common graphical tools (such as box plots, histograms and stem plots) and summary statistics (such as mean, median, mode, variance and IQR)
• Assess which methods for summarising a data set are most appropriate to highlight interesting features of the data.
• Identity possible sources of bias and founding in experiments and surveys.
• Understand the concept of the sampling distribution of a statistic, and in particular desirable the behaviour of the sample mean.
• Construct the probability distribution of a random variable, based on a real – world situation, and use it to compute expectation and variance Basic probability
axioms and rules and describe the properties of discrete and continuous distribution functions.

- Calculate the simple linear regression equation for a set of data and know the basic assumptions behind regression analysis.
- Assessing the process control and production control using the concept of Statistical Quality Control (S.Q.C.)

UNIT I Random variables and Distributions:

UNIT II Moments and Generating functions:
Introduction-Mathematical expectation and properties – Moment generating function - Moments of standard distributions (Binomial, Poisson and Normal distributions) – Properties

UNIT III Sampling Theory:
Introduction - Population and samples- Sampling distribution of mean for large and small samples (with known variance) - Proportion sums and differences of means -Sampling distribution of variance.

UNIT IV Tests and Hypothesis:
Introduction - Type I and Type II errors - Maximum error - One tail, two-tail tests- Tests concerning one mean and proportion, two means- Proportions and their differences using Z-test, Student’s t-test - F-test.

UNIT V Curve Fitting and Correlation:
Introduction - Fitting a straight line -Second degree curve - exponential curve-power curve by method of least squares. Simple Correlation, Rank correlation.

UNIT VI Statistical Quality Control Methods:
Introduction - Methods for preparing control charts – Problems using x-bar, p, R charts and attribute charts

References:
1. Probability and Statistics for Engineers: Miller and John E. Freund, Prentice Hall of India

WEB LINKS:
- https://www.khanacademy.org
- http://probweb.berkeley.edu/teaching.html
- http://www.giacomo.lorenzoni.name/(S(lvmu2b45htk3rarcuj3iiray))/arganprobstat/Default.aspx
- http://www.math.uah.edu/stat/
- http://onlinestatbook.com/2/probability/poisson.html
- https://www.umass.edu/wsp/resources/poisson/
- https://onlinecourses.science.psu.edu/stat500/node/40
- https://people.richland.edu/james/lecture/m170/ch13-f.html
• https://explorable.com/students-t-test
• https://math.hws.edu/javamath/ryan/ChiSquare.html
Course Objectives:
The objectives of this course are:
- To inculcate an ability to relate engineering problems to mathematical context.
- To study the basic principles of Complex Variables
- To Compute complex line integrals, Use the residue theorem, Launrets Theorem
- To Understand the elementary aspects of probability theory.
- To get Knowledge on testing of hypothesis for all size of samples

Course Outcomes:
Student will be able to
- Analyze and know the condition for a complex variable function to be analytic and/ or harmonic
- Identify the applicability of theorems and evaluate the contour integrals.
- Apply the skill of contour integration to evaluate complicated real integrals via Residue calculus.
- Apply the concept of probability distribution and sampling theory to engineering problems.
- Recognize the concept of the sampling distribution of a statistic and in particular describe the behavior of the sample mean.
• Use specific tests including z-test, t-test, F-test and Chi-Square test.

UNIT-I: Functions of a complex variable

UNIT-II: Integration and Series Expansions

UNIT-III: Integration using Residues
Types of Singularities: Isolated singular point – pole of order m – essential singularity. Residue –Residue theorem (without proof) . Evaluation of integrals of the type

(a) Improper real integrals \[ \int_{-\infty}^{\infty} f(x)dx \] (b) \[ \int_{c}^{c+2\pi} f(\cos\theta,\sin\theta)d\theta \]

UNIT-4: Random Variables And Distributions
UNIT-V: Sampling Distributions and Testing of Hypothesis for large samples:
Population and samples - Sampling distribution of means (with known and unknown variance), proportion, - Type I and Type II errors - One tail, two-tail tests. Testing hypothesis concerning to single mean and single proportion - two means and two Proportions.

UNIT-VI: Testing of Hypothesis for small samples:
Student’s t-test for single mean and difference of means, F-test for difference of variances, $\chi^2$ - test as a test of goodness of fit and independence of attributes,

Text Books:
3. Higher Engineering Mathematics, B.S.Grewel

References
2. Probability and statistics by – ATHANASIA

WEB LINKS:
- https://www.math.ust.hk/~maykwok/courses/ma3
04/06_07/Complex_4.pdf
- http://sym.lboro.ac.uk/resources/Handout_Residue_Theorem.pdf
- http://onlinestatbook.com/2/probability/poisson.html
- https://www.umass.edu/wsp/resources/poisson/
- https://onlinecourses.science.psu.edu/stat500/node/40
- https://people.richland.edu/james/lecture/m170/ch13-f.html
- https://explorable.com/students-t-test
Course Objectives:
The objectives of this course are:

- To provide an introduction to special functions and its properties.
- To inculcate an ability to relate engineering problems to mathematical context.
- To study the basic principles of Complex Variables
- To Compute complex line integrals, Use the residue theorem, Laurents Theorem

Course Outcomes:
Student will be able to

- Solve complicated definite integrals and higher order differential equations using special functions.
- know the condition(s) for a complex variable function to be analytic and/or harmonic
- define singularities of a function, know the different types of singularities, and be able to determine the points of singularities of a function
- apply the skill of contour integration to evaluate complicated real integrals via residue calculus.
- Use Cauchy’s integral theorem and formula to compute line integrals
UNIT – I Special functions: Gamma and Beta Functions – Their properties – evaluation of improper integrals..


UNIT-III Integration and Series Expansions

UNIT-IV: Integration using Residues
Types of Singularities: Isolated singular point – pole of order m – essential singularity. Residue –Residue theorem (without proof) . Evaluation of integrals of the type
(a) Improper real integrals \( \int_{-\infty}^{\infty} f(x)dx \) (b) \( \int_{c}^{c+2\pi} f(\cos\theta,\sin\theta)d\theta \)

UNIT-V Argument principle – Rouche’s theorem – determination of number of zeros of complex polynomials - - Fundamental theorem of Algebra,
UNIT-VI Conformal mapping: Transformation by $z^e$, $\ln z$, $z^2$, $z^n$ (n positive integer), $\sin z$, $\cos z$, $z + a/z$. Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles and cross ratio – determination of bilinear transformation mapping 3 given points.

Text Books:
2. Special functions & Complex variables, Shahnaz Bathul, Prentice Hall of India.

References:

WEB LINKS:
- https://en.wikipedia.org/wiki/Beta_function
- http://www.sosmath.com/calculus/improper/gamma/gamma.html
- https://www.encyclopediaofmath.org/index.php/Be
ssel_equation

- https://www.math.usm.edu/lee/mathphysarchive/?p=858
- http://math.stanford.edu/~ryzhik/shabat-all.p
- http://sym.lboro.ac.uk/resources/Handout_ResidueTheorem.pdf
Course Objectives:

The student can able to understand

- The basic tools of optimization techniques those are useful in design, analysis, and control of complex systems.
- To use quantitative methods and techniques for effective decisions-making

Course Outcomes:

- Optimization Techniques is applied to a broad range of problems in both the public and private sectors.
- Many problems deal with the allocation of scarce human resources, money, materials, equipment or facilities. Applications include staff scheduling, vehicle routing, warehouse location, product distribution, quality control, traffic light phasing, police patrolling, preventive maintenance scheduling, economic forecasting, design of experiments, power plant fuel allocation, stock portfolio optimization and cost effective environmental protection.

UNIT – I LINEAR PROGRAMMING PROBLEM:
Linear programming problem formulation – graphical solution – simplex method- artificial variables technique-
big-M method.

UNIT – II TRANSPORTATION PROBLEM:
Formulation – optimal solution, unbalanced transportation problem – degeneracy

UNIT – III SEQUENCING PROBLEM:
Introduction – flow –shop sequencing – $n$ jobs through two machines – $n$ jobs through three machines – job shop sequencing – two jobs through ‘$m$’ machines.
Replacement Problem: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.


UNIT – VI P.E.R.T. & C.P.M.: 

14
Drawing networks – identifying critical path – probability of completing the project within given time- project crashing – optimum cost and optimum duration.

**TEXT BOOKS:**
- Operations Research / S.D.Sharma-Kedarnath
- Introduction to O.R/Hiller &Libermann (TMH).

**REFERENCES:**
- Operations Research: Methods & Problems / Maurice Saseini, ArhurYaspan& Lawrence Friedman
- Operations Research / Wagner/ PHI Publications.
- Operation Research /J.K.Sharma/MacMilan.

**WEB LINKS:**
- [https://www.math.ucla.edu/~tom/LP.pdf](https://www.math.ucla.edu/~tom/LP.pdf)
- [wwelearning.vtu.ac.in/11/enotes/Operationres/Unit 4-GR.pdf](wwelearning.vtu.ac.in/11/enotes/Operationres/Unit 4-GR.pdf)
- [web.itu.edu.tr/topcuil/ya/OR.pdf](web.itu.edu.tr/topcuil/ya/OR.pdf)
- [nsdl.niscair.res.in/jspui/bitstream/123456789/1047/1/Chapter%208.pdf](nsdl.niscair.res.in/jspui/bitstream/123456789/1047/1/Chapter%208.pdf)
- www2.kimep.kz/bcb/omis/our_courses/is4201/Chap14.pdf
Course Objectives:
- Students will learn core ideas in graph theory.

Course Outcomes:
Student will be able to
- Define the language of graphs and trees.
- Explain the Eulerian and Hamiltonian graphs.
- Understand cut sets in a graph, fundamental circuits, seperability, network flows one and two isomorphisms.
- Analyze the properties of trees and able to find a minimal spanning tree for a given weighted graph.
- Relate vector spaces and graphs.
- Represent graphs as matrices.

UNIT - I PATHS AND CIRCUITS:
Isomorphism, sub graphs, paths and circuits, connected graphs, disconnected graphs, components, Euler graphs, Operations on graphs, Hamiltonian paths and circuits, traveling salesman problem.

UNIT -II TREES AND FUNDAMENTAL CIRCUITS:
Trees, Properties of trees, pendant vertices in a tree, distances and centers in a tree, rooted and binary trees, on counting trees, spanning trees, fundamental-circuits, finding all spanning trees of a graph, spanning trees in a weighted graphs

UNIT -III CUT SETS AND CUT VERTICES:
Cut sets, all cut sets in a graph, fundamental circuits and cut sets, connectivity and separability, network flows, One-isomorphism, two-isomorphism.

UNIT -IV PLANAR AND DUAL GRAPHS:
Combinatorial Vs geometric Graphs, Planar Graphs, Kuratowskis two graphs, different representation of a planar graph, detection of planarity, geometric dual.

UNIT -V VECTOR SPACES OF A GRAPH:
Set with one operation, Sets with two operations, Modular arithmetic and Galois field, Vectors and Vector Spaces, Vector Space associated with a graph, basis vectors of a graph.

UNIT -VI MATRIX REPRESENTATION OF GRAPHS:

REFERENCE BOOKS:
- Narsing deo “Graph Theory with applications to Engineering and Computer Science” Prentice hall of India, Pvt. Ltd, New Delhi.

RECOMMENDED BOOKS:
• Haraary Frank, Graph Theory, Narosa Publishing House(2001).
• Diestel, R., Graph Theory, Springer(2000).

WEB LINKS:
• http://www.tutorialspoint.com/graph_theory/graph_theory_fundamentals.htm
• http://mathworld.wolfram.com/IsomorphicGraphs.html
• https://en.wikipedia.org/wiki/Cycle_(graph_theory)
• http://www.mathcove.net/petersen/lessons/get-lesson?les=5
• http://webwhompers.com/graph-theory.html
• http://web.cecs.pdx.edu/~sheard/course/Cs163/Doc/Graphs.html
• http://www.tutorialspoint.com/graph_theory/graph_theory_trees.htm
• http://world.mathigon.org/Graph_Theory
• https://www.ics.uci.edu/~eppstein/161/960206.htm
• http://www.dharwadker.org/pirzada/applications/
ELECTRICAL MACHINES-I LAB
II B.TECH II SEM

Course Objectives:

- To draw the performance characteristics of DC shunt, series and compound generators.
- To draw the performance characteristics of DC shunt, series and compound motors.
- To determine the speed control characteristics of DC motors.

Course Outcomes:

- The students are able to draw the characteristics of speed-torque- current relations and efficiency curves of shunt, series and compound generators.
- The students are able to draw the characteristics of speed-torque- current relations and efficiency curves of shunt, series and compound motors.
- The students are able to control the speed DC shunt motor with flux and armature control methods.

The following experiments are required to be conducted compulsory experiments:

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson’s test on DC shunt machines. Predetermination of efficiency.
7. Swinburne’s test and speed control of DC shunt motor. Predetermination of efficiencies.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted:

Web Links:
2. www.scoopworld.in › R13
ELECTRONIC DEVICES AND CIRCUITS LABORATORY

II B.TECH II SEM

Course Objectives:
- To understand an overview of the principles, operation of diodes, BJT, FET.
- To develop the knowledge on qualitative analysis and makes use of Simple models and equation to illustrate the concept involved.
- To provide an overview of amplifiers, feedback amplifiers and oscillators.

Course outcomes:
- Should able to understand the operating principles of major electronic devices, circuit models and connection to the physical operation of device.
- Able to design circuit for testing various devices
- An ability to design and conduct experiments, as well as to organize, analyzes, and interprets data.
- Able to obtain the performance characteristics of various devices.

PART A: Electronic Workshop Practice
1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJT's, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments (For Laboratory Examination-Minimum of Ten Experiments)

1. P-N Junction Diode Characteristics
   Part A: Germanium Diode (Forward bias & Reverse bias)
   Part B: Silicon Diode (Forward Bias only)
2. Zener Diode Characteristics
   Part A: V-I Characteristics
   Part B: Zener Diode as Voltage Regulator
3. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
4. BJT Characteristics (CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. FET Characteristics (CS Configuration)
   Part A: Drain Characteristics
   Part B: Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

PART C: Equipment required for Laboratory
1. Boxes
2. Ammeters (Analog or Digital)
3. Voltmeters (Analog or Digital)
4. Active & Passive Electronic Components
5. Regulated Power supplies
6. Analog/Digital Storage Oscilloscopes
7. Analog/Digital Function Generators
8. Digital Multimeters
9. Decade Resistance Boxes/Rheostats
10. Decade Capacitance
SKILL DEVELOPMENT-I  
(DISCIPLINE CENTRIC)

OOPS with C+++

II B.TECH II SEM

L  P  C
1  2  2

Course Objectives:
1. Focus on object oriented concepts and java program structure and its installation.
2. Comprehension of java programming constructs, control structures in Java.
3. Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling.
4. Understanding of Thread concepts and I/O in Java.
5. Being able to build dynamic user interfaces using applets and Event handling in java.
6. Understanding of various components of Java AWT and Swing and writing code snippets using them.

List of Experiments

1. Study on basic Java concepts, byte code representation and OOP principles
2. Study on Java data types, variable declaration, scope of variables, arrays and operators.
3. Experiments on simple Java programs
4. Experiments on sorting a numbers.
5. Experiments on linear and binary search
6. Experiments on matrix manipulations
7. Experiments on constructors and static data methods
8. Experiments on garbage collections
9. Experiments on function overloading
10. Experiments on Exception Handling mechanism
11. Experiments on parameter passing-call by value, call by reference
12. Experiments on File operations
13. Study and experiments on Threads

Web links:

2. https://www.codeproject.com/Articles/22769/Introduction-to-Object-Oriented-Programming-Concep
3. https://docs.oracle.com/javase/tutorial/java/concepts/

References:

2. Big Java 2nd Edition, Cay Horstmann, John Wiley and Sons

Course Outcomes:
1. Understand the format and use of objects.
2. Understand basic input/output methods and their use.
3. Understand object inheritance and its use.
4. Understand development of JAVA applets vs. JAVA applications.
5. Understand the use of various system libraries
SKILL DEVELOPMENT-I  
(DISCIPLINE CENTRIC)  
MATLAB PROGRAMMING-1  
II B.TECH II SEM  

L  P  C  
1  2  2  

COURSE OBJECTS:  
• To know about MATLAB programming.  
• To know about Simulink Library.  
• To know about Matrix operation in MATLAB.  
• To know about conditional statements in MATLAB.  
• To know about plotting function in MATLAB.  

List of experiments  
1. Study on introduction to MATLAB programming.  
2. Study on introduction to Simulink Library.  
3. Experiment on Matrix operations (Addition and Subtraction)  
4. Experiment on Matrix operations (Multiplication and Division)  
5. Experiment on INVERSE of Matrix operation.  
6. Experiment on IF statement.  
7. Experiment on FOR LOOP.  
8. Experiment on WHILE condition.  
9. Experiment on BREAKE/CASE statement.  
10. Experiment on plotting function.
COURSE OUTCOMES:

- Able to know about MATLAB programming.
- Able to know about Simulink Library.
- Able to know about Matrix operation in MATLAB.
- Able to know about conditional statements in MATLAB.
- Able to know about plotting function in MATLAB.

Web links:

1. https://in.mathworks.com/

REFERENCES

2. MATLAB and SIMULINK for Engineers (Oxford Higher Education)Pap/Cdr Edition
By Agam Kumar Tyagi
3. MATLAB Guide to Finite Elements 2008 by Peter I. Kattan
SKILL DEVELOPMENT-I  
(DISCIPLINE CENTRIC)  
DESIGN OF PRINTED CIRCUIT BOARD-1  
II B.TECH II SEM  

Course Outcomes:  
1. Familiarization of PCB Circuit Terminology and able to design a circuit and create a schematic Capture  
2. Become proficient with computer skills (eg., Power logic and Power PCB) for drawing Schematic and PCB Layout  
3. To Create PCB Art work and CAM Files  
4. To Create New part and to Fabricate a Prototype PCB  

Course Objectives  
1. Become familiar with the simulation software  
2. Learn to use Power logic and power PCB  
3. Setup parameters, simulate and Generate CAM Files  

Exp 1:  
- Introduction to Printed Circuit Board  
- About PCB  
- PCB fabrication process  
- Importance of PCB design  

Exp 2:  
- Types of PCBs  
- Multi layer PCBs
• Material used for PCB

Exp 3:
• Introduction to CAD Tools
• Overview of CAD tools
• Generic tools

Exp 4:
• Introduction to Software
• Introduction to PCB Design Software
• Schematic capture
• Schematic to PCB conversion

EXP 5:
• Training on Schematic Capture
• Creating new project
• Introduction to the tools
• Introduction to component Manager

Exp 6:
• Schematic Capture
• Placing components
• Interconnection of components, wiring

Exp 7:
• Labelling the nets
• DRC check
• Fixing up the errors

Exp 8:
• Training on Schematic to PCB Conversion
• Introduction to design rules
• Introduction to layers
• Defining board size
• Conversion of Schematic to PCB
• Auto routing
• Interactive routing

Exp 9:
• Introduction to PCB Design tools
• Selection of foot prints
• Wiring the interconnection
• Manipulation of tracks
• Manipulation of pads
• Preparation of silk screen
• Creating silk screen

Exp 10:
• PCB making process
• Handling of chemicals
• About Film
• Transfer of film
• Transfer of circuit on to copper clad

Exp 11:
• Drying process
• Etching process
• Cleaning process
• Drilling

Weblinks:

References:

1. Printed Circuit Board Designer's Reference: Basics By Christopher T.Robertson
2. Electronics Devices And Circuits By A.P.Godse, U.A.Bakshi
SKILL DEVELOPMENT –I  
(DISCIPLINE CENTRIC) 

Technical Essentials for Electrical and Electronics Engineers-I

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Electric Circuits – I
- Network graph, KCL, KVL, Node and Mesh analysis, Sinusoidal steady-state analysis, Resonance, Passive filters, Ideal current and voltage sources.

Electric Circuits – II
- Thevenin’s theorem, Norton’s theorem, Superposition theorem, Maximum power transfer theorem, Two-port networks.

Electric Circuits – III
- Transient response of dc and ac networks, Three phase circuits, Power and power factor in ac circuits.

Electromagnetic Fields – I
- Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss's Law, Divergence, Electric field and potential due to point, line, plane and spherical charge distributions,

Electromagnetic Fields – II
- Effect of dielectric medium, Capacitance of simple configurations, Biot-Savart’s law,
Electromagnetic Fields – III
Ampere’s law, Curl, Faraday’s law, Lorentz force, Inductance, Magnetomotive force, Reluctance, Magnetic circuits, Self and Mutual inductance of simple configurations.
Objectives:

✓ To learn about construction details and performance characteristics of salient and non-salient type synchronous generators.
✓ To know the working principle and study the performance characteristics of synchronous motor.
✓ To learn about construction details, working principle and performance of single phase induction motors.

Outcomes:
The students are able to

✓ Ability to identify the working principle of synchronous generator.
✓ Ability to analyze the operation of synchronous machine.
✓ Ability to recognize working principle of synchronous motor
✓ Ability to discriminate synchronous machine characteristics.
✓ Ability to explain the operation of single phase induction motors
✓ Ability to describe the types of single phase machines

UNIT-I Synchronous generators

General constructional features, principle of operation, types of rotor, e.m.f. equation, short pitch winding and pitch factor, distributed winding and distribution factor. Cylindrical rotor generator: Interaction between excitation flux and armature m.m.f., steady state equivalent circuit and phasor diagram, steady state power flow and power angle.
characteristics, Open circuit, short-circuit and zero power factor (lagging) tests, Short Circuit Ratio (SCR).

UNIT-II Synchronous generators Operation:
Voltage regulation by synchronous impedance, m.m.f. and Potier’s triangle methods, Synchronization and parallel operation of synchronous generators (Alternators). Synchronizing current, synchronizing power and synchronizing torque. Significance of synchronous reactance in synchronous operation. Load sharing.

UNIT-III Synchronous motor:

UNIT-IV Synchronous Machine Characteristics:

UNIT-V Single Phase Machines – I:

UNIT-VI Single Phase Machines – II:

TEXT BOOKS
3. Electrical Machines by J.B.Guptha. S.K.Kataria & Sons

REFERENCES
1. Performance and Design of AC machines – M.G Say
2. Theory of Alternating Current machines – Alexander Lagnsdorf
3. A.C Commutator motor – Openshaw Taylor
4. Alternating Current machines – Puchstein & Lloyd

WEB LINKS
1. ocw.mit.edu › ... › Electric Machines
3. www.scoopworld.in › EEE
Objectives:

✓ To get an overview of different types of power semiconductor devices and to know the static and switching characteristics of SCR
✓ To understand the operation, characteristics and performance parameters of controlled rectifiers.
✓ To study the operation, switching techniques and basic topologies of DC-DC converters.
✓ To learn the different modulation techniques of pulse width modulated inverters and to understand the harmonic reduction methods
✓ To study the operation of AC voltage controller and cyclo-converters.

Outcomes:
The students are able to

✓ Ability to identify the basic semiconductor devices and the characteristics of SCR.
✓ Ability to analyze the 1-phase half and full controlled converters with R and RL loads.
✓ Ability to recognize the 3-phase half and full controlled converters with R and RL loads.
✓ Ability to explain the operation of Buck and Boost converters.
✓ Ability to describe the operation of Single-phase and three inverters along with PWM techniques.
Ability to reproduce the operation of Single-phase AC Voltage controllers and Cycloconverters.

UNIT I: POWER SEMI-CONDUCTOR DEVICES
Brief introduction to power semiconductor devices (Diode, BJT, MOSFET and IGBT), Basic theory of operation of SCR- Static characteristics- Turn on and turn off methods, Dynamic characteristics of SCR- Firing circuits for SCR, Snubber circuit design- Numerical problems.

UNIT II: SINGLE PHASE-CONTROLLED CONVERTERS
1-pulse (Half Controlled) and 2-pulse converters (Fully Controlled) with R and RL (continuous current mode only) loads. Derivation of average voltage and current – Effect of source inductance –Harmonic analysis for input current waveform in a system with a large load inductance – Calculation of input power factor.

UNIT III: THREE PHASE-CONTROLLED CONVERTERS
3-pulse (Half Controlled) and 6-pulse converters (Fully Controlled) with R and RL loads- Derivation of average voltage and current – Effect of source inductance – Dual converters with non-circulating and circulating currents.

UNIT IV: DC TO DC CONVERTERS
Time ratio control and current limit control strategies, High frequency DC–DC converters: Buck Converter operation--Voltage and current waveforms--Derivation of output voltage--Boost converter operation-- voltage and current waveforms--Derivation of output voltage – Buck-Boost converter operation –Voltage and current waveforms.
UNIT V:  INVERTERS
Single-phase Bridge inverters, Voltage control in single phase inverter, Three-phase Inverters (120\degree and 180\degree modes of operation), PWM techniques - single pulse, multiple pulse and Sinusoidal PWM.

UNIT VI:  AC TO AC CONVERTERS
Single phase AC voltage controllers with R and RL loads using SCR-Derive RMS output voltage - single phase cycloconverters (Step Up and Step down) operation only - Introduction to Integral cycle control.

TEXT BOOKS

REFERENCES

WEB LINKS
1. www.nptel.ac.in/downloads/108105066/
2. ocw.mit.edu › ... › Power Electronics
3. www.academia.edu/5906065/POWER_ELECTRONICS-NOTES
TRANSMISSION OF ELECTRIC POWER

III Year – I Sem

L  T  P  C
2  1  0  3

Objectives:
✓ To compute inductance of transmission lines and to understand the concepts of GMD, GMR.
✓ To compute capacitance of transmission lines and to understand the concepts of corona.
✓ To study short and medium length transmission lines, their models and performance computation.
✓ To study long transmission lines, their models and performance computation.
✓ To study the mechanical design of overhead transmission line insulators.
✓ To study the mechanical design of overhead transmission line with sag and tension concepts.

Outcomes:
The students are able to
✓ Ability to develop the surge behavior of transmission line for protection of connected equipments, viz. power transformer and system connected shunt reactors.
✓ Ability to classify various phenomena related to charge transmitting different level of power.
✓ Ability to discriminate physical and geometrical parameters of transmission line for safe and efficient performance during operating condition of voltage and power.

UNIT - I  TRANSMISSION LINE PARAMETERS - I
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, Skin effect, Proximity effect and Spirality effect.

UNIT - II  TRANSMISSION LINE PARAMETERS - II
Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for single and three phase, single and double circuit lines. – Numerical Problems.
Corona: description of the phenomenon, factors affecting corona, critical voltages and power loss, radio interference.

UNIT - III PERFORMANCE OF TRANSMISSION LINES - I

UNIT - IV PERFORMANCE OF TRANSMISSION LINES - II

UNIT-V: OVER HEAD LINE INSULATORS
Insulators: Types of insulators, string efficiency and methods for improvements. Voltage distribution, calculation
of string efficiency, capacitance grading and static shielding– Numerical Problems.

UNIT-VI: SAG & TENSION CALCULATIONS:
Sag and Tension calculations with equal and unequal heights of towers, effect of wind and ice on weight of conductor, stringing chart and sag template– Numerical Problems.

TEXT BOOKS:

REFERENCE BOOKS:
3. W.D. Stevenson, “Elements of Power system analysis”, MG Hill

WEB LINKS
1. nptel.ac.in/courses/108105053/pdf/L-02(TB)(ET)%20((EE)NPTEL).pdf
2. www.rejinpaul.com/2013/.../10ee36-electric-power-generation-notes.htm...
3. castlelab.princeton.edu/EnergyResources/GenerElectPower__Shalaan.pdf
LINEAR & DIGITAL IC APPLICATIONS

III Year –I Sem  
L  T  P  C  
2  1  0  3

OBJECTIVES

- Provide a strong foundation on characteristics, realize circuits, and design for signal analysis using Op-amp ICs.
- Familiarize students with applications of linear and non-linear in the operational amplifiers.
- Have a broad coverage in the field that is relevant for engineers to design active filters using Op-amps.
- Familiarize the various types of ADCs and DACs.
- Provide the Design skills on the various applications of combinational and sequential logic circuits.
- Familiarize students with applications of IC 555 timer, PLL and VCO.

OUTCOMES

- After going through this course the student will be able to
- Differentiate between “Linear Circuits & Digital Circuits”.
- Design the circuits using operational amplifiers for various applications.
- Analyze and design the amplifiers and active filters using Op-amp.
- Understand the IC 555 timer, PLL and VCO with applications.
- Understand the various types of ADCs and DACs.
- Design combinational and sequential logic circuits for different applications.

UNIT I

INTEGRATED CIRCUITS:


UNIT II

APPLICATIONS OF OP-AMPS: Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters,
Buffers. Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log amplifiers, Precision rectifiers, sample and hold amplifier

UNIT III
**ACTIVE FILTERS:** Introduction, Butterworth filters- 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters.

**D to A & A to 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 dual slope ADC.ADC and DAC Specifications.

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, 565 PLL, Applications of PLL

UNIT V
COMBINATIONAL LOGIC DESIGN: Introduction, Design and Analysis procedures, Decoders, encoders, multiplexers and de multiplexers, comparators, adders & subtractors using IC’s

UNIT VI
SEQUENTIAL LOGIC DESIGN: Introduction, Latches, and flip-flops, Counters, Design of Counters using Digital IC’s, shift Registers, Ring Counter, Johnson Ring Counter

TEXT BOOKS:

REFERENCES:
3. Digital Design By Mano, Pearson Education.
OBJECTIVES:

- To understand the concept and nature of Managerial Economics and its relationship with other disciplines.
- To create awareness different market structure and significance of various pricing methods.
- To know the different forms of Business organization and their merits and demerits.
- To understand the different Accounting Systems to prepare Financial Statements and the usage of various accounting tools for analysis.
- To evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

OUTCOMES:

At the end of this course student should be able to:

- use demand analysis and understand the nature and purpose of Demand for a product and the relationship between Price and Demand.
- recognize the information conveyed in the Cost Concepts for decision making and to estimate the least cost combination of inputs.
- compute financial statement analysis.
- explain and discuss the various investment project proposals with the help of capital budgeting techniques for decision making.

Unit – I:

Unit – II:


Unit – III:


Unit – IV:

Unit – V:

**Introduction to Accounting & Financing Analysis:** Introduction to Double Entry Systems – Preparation of Financial Statement Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow- cash flow statements (Simple Problems).


**TEXT BOOKS :**


**REFERENCES :**

1. V. Maheswari : Managerial Economics, Sultan Chand.
ADVANCED CONTROL SYSTEMS

III Year –I Sem

Objectives:
✓ To discuss the basic aspects of design and compensation of linear control systems in frequency domain.
✓ To formulate state models and analyze the systems
✓ To find the controllability and observability of a control system and design of feedback controller through the pole placement technique.
✓ Analysis of a nonlinear system using Describing function approach
✓ Analysis of Nonlinear system using Phase plane analysis.
✓ The Lyapunov’s method of stability analysis of a system.

Outcomes:
✓ Able to analyse compensating techniques.
✓ State space representation of control system and formulation of different state models are reviewed.
✓ Able to design of control system using the pole placement technique is given after introducing the concept of controllability and observability.
✓ Able to analyse of nonlinear system using the describing function technique.
✓ Able to analyse of nonlinear system using phase plane analysis.
✓ Able to analyse the stability analysis using Lyapnov method.

UNIT - I CLASSICAL CONTROL DESIGN TECHNIQUES
Compensation techniques- Lag, Lead and Lead-Lag compensators design in frequency domain


TEXT BOOKS:
1. Modern Control System Theory by M. Gopal – New Age International – 1984

WEB LINKS
1. nptel.ac.in/courses/101108047/module1/Lecture%201.pdf
2. www.docsity.com › Documents › Study notes › Study notes Engineering
3. www.me.umn.edu/courses/me8281/notes.htm
Objectives:

✓ To conduct the different test on single phase transformer to find its performance
✓ To conduct test on three-phase transformer for 3-phase to 2-phase conversion.
✓ To determine the regulation of three-phase alternator using impedance and mmf methods.
✓ To plot the V and Inverted V, and Xd, Xq curves of synchronous machine.
✓ To draw the equivalent circuit of single phase induction motor.

Outcomes:
The students are able to

✓ Predetermine the efficiency and regulation of transformers and assess their performance.
✓ Predetermine the regulation of three phase alternator by various methods, find Xd/Xq ratio of alternator.
✓ To perform various tests on three phase synchronous motor for assessing its performance.
✓ To perform various tests on induction motor for assessing its performance.

The following experiments are required to be conducted as compulsory experiments:
1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner’s test on single phase transformers
3. Scott connection of transformers
4. No-load & Blocked rotor tests on three phase Induction motor
5. Regulation of a three-phase alternator by synchronous impedance & m.m.f. methods
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, at least any two of the following experiments are required to be conducted from the following list:
1. Parallel operation of Single phase Transformers
2. Separation of core losses of a single phase transformer
3. Brake test on three phase Induction Motor
4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
5. Efficiency of a three-phase alternator
6. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers

WEB LINKS
1. www.iare.ac.in/sites/default/.../lab2/machines%20laboratory%20NEW.pdf.
2. www.eee.griet.ac.in/wp-content/uploads/.../AC-Machines-Lab-Manual.pdf...
Objectives:

- To impart hands on experience to understand the performance of basic control system components such as magnetic amplifiers, D.C. servo motors, A.C. Servo motors, stepper motor and potentiometer.
- To understand time and frequency responses of control system with and without controllers and compensators.

Outcomes:
The students are able to

- Able to analyze the performance and working Magnetic amplifier, D.C. servo motors, A.C. Servo motors and synchronous motors
- Able to design P, PI, PD and PID controllers
- Able to design lag, lead and lag–lead compensators
- Able to control the temperature using PID controller
- Able to determine the transfer function of D.C. motor
- Able to control the position of D.C servo motor performance

Any Eight 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. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation – Magnitude and phase plot  
7. Transfer function of DC generator  
8. Temperature controller using PID  

**Any two experiments are to be conducted:-**  
1. Characteristics of magnetic amplifiers  
2. Characteristics of AC servo motor  
4. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system  

**REFERENCE BOOKS:**  
1. Simulation of Electrical and electronics Circuits using PSPICE – by M.H.Rashid, M/s PHI Publications.  
2. PSPICE A/D user’s manual – Microsim, USA.  
3. PSPICE reference guide – Microsim, USA.  
4. MATLAB and its Tool Books user’s manual and – Mathworks, USA.  

**WEB LINKS**  
1. [www.nit.ac.in/pdf/labs/electrical/control.pdf](http://www.nit.ac.in/pdf/labs/electrical/control.pdf)  
2. [www.iitk.ac.in/ee/data/...labs/Control_System/EE380_lab_manual.pdf](http://www.iitk.ac.in/ee/data/...labs/Control_System/EE380_lab_manual.pdf)
Skill development (Discipline Centric)

OOP through JAVA
III B.TECH I SEML  P    C

1  2  2

Course Objectives:
1. Focus on object oriented concepts and java program structure and its installation.
2. Comprehension of java programming constructs, control structures in Java.
3. Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling.
4. Understanding of Thread concepts and I/O in Java.

Course Outcomes:
1. Understand the format and use of objects.
2. Understand basic input/output methods and their use.
3. Understand object inheritance and its use.
4. Understand the use of various system libraries

List of Experiments
14. Study on basic Java concepts, byte code representation and OOP principles
15. Study on Java data types, variable declaration, scope of variables, arrays and operators.
16. Experiments on simple Java programs
17. Experiments on sorting a numbers.
18. Experiments on linear and binary search
19. Experiments on constructors and static data methods
20. Experiments on function overloading
21. Experiments on Exception Handling mechanism
22. Experiments on parameter passing-call by value, call by reference
23. Study and experiments on Threads

Web links:

5. https://www.codeproject.com/Articles/22769/Introduction-to-Object-Oriented-Programming-Concep
6. https://docs.oracle.com/javase/tutorial/java/concepts/

References:

2. Big Java 2nd Edition, Cay Horstmann, John Wiley and Sons
Skill development (Discipline Centric)

MATLAB PROGRAMMING-2
III B.TECH I SEM

COURSE OBJECTS:
1. To know about MATLAB programming.
2. To know about Simulink Library.
3. To know about Matrix operation in MATLAB.
4. To know about conditional statements in MATLAB.
5. To know about plotting function in MATLAB.

List of experiments
1. Cascaded Multilevel Inverter model.
2. Eleven level H Bridge model.
3. MLI unequal DC sources model.
4. Five Level H Bridge model.
5. Power HEV MultiFidelity
6. 5 Level Diode clamped PWM.
7. 13 Level Diode clamped Single phase PWM.
8. Three phase pwm inverter.
9. Square wave inverter.
10. PWM strategy connected to PV/Fuel cell.
11. MLI with POD.
12. MLI with APOD.
13. MLI with optimal (Level shift & phase).

COURSE OUTCOMES:
1. Able to know about MATLAB programming.
2. Able to know about Simulink Library.
3. Able to know about Matrix operation in MATLAB.
• Able to know about conditional statements in MATLAB.
• Able to know about plotting function in MATLAB.

Web links:

REFERENCES
2. MATLAB and SIMULINK for Engineers (Oxford Higher Education) Pap/Cdr Edition
   By Agam Kumar Tyagi
3. MATLAB Guide to Finite Elements 2008 by Peter I. Kattan
Course Outcomes:
5. Familiarization of PCB Circuit Terminology and able to design a circuit and create a schematic Capture
6. Become proficient with computer skills (eg., Power logic and Power PCB) for drawing Schematic and PCB Layout
7. To Create PCB Art work and CAM Files
8. To Create New part and to Fabricate a Prototype PCB

Course Objectives
4. Become familiar with the simulation software
5. Learn to use Power logic and power PCB
6. Setup parameters, simulate and Generate CAM Files

List of Experiments
Expt No: 1Introduction to Printed Circuit Board
• About PCB
• PCB fabrication process
• Importance of PCB design
• Types of PCBs
• Multi layer PCBs
• Material used for PCB

Expt No: 2Introductions to CAD Tools
• Introduction to CAD tools
• Overview of CAD tools
• Generic tools

Expt No: 3Introductions to Software
• Introduction to PCB Design Software
• Schematic capture
• Schematic to PCB conversion

Expt No: 4 Training on Schematic Capture
• Creating new project
• Introduction to the tools
• Introduction to component Manager
• Schematic Capture
• Placing components
• Interconnection of components, wiring
• Labelling the nets
• DRC check
• Fixing up the errors

Expt No: 5 Training on Schematic to PCB Conversion
• Introduction to design rules
• Introduction to layers
• Defining board size
• Conversion of Schematic to PCB
• Auto routing
• Interactive routing
• Introduction to PCB Design tools
• Selection of foot prints
• Wiring the interconnection
• Manipulation of tracks
• Manipulation of pads
• Preparation of silk screen
• Creating silk screen

Expt No: 6 PCB making process
• Handling of chemicals
• About Film
• Transfer of film
• Transfer of circuit on to copper clad
• Drying process
• Etching process
• Cleaning process
• Drilling

Expt No: 7 Evaluation
• Final output check
• Interactive session
• Closure

Weblinks:

References:
1. Printed Circuit Board Designer's Reference: Basics By Christopher T. Robertson
2. Electronics Devices And Circuits By A.P. Godse, U.A. Bakshi
Technical Essentials for Electrical and Electronics Engineers-II

III Year –I Sem

L  P  C
1  2  2

Transformers

Single phase transformer: equivalent circuit, phasor diagram, open circuit and short circuit tests, regulation and efficiency, three phase transformers: connections, parallel operation; Auto-transformer

Three Phase Induction Motors

Three phase induction motors: principle of operation, types, performance, torque-speed characteristics, no-load and blocked rotor tests, equivalent circuit, starting and speed control

Single Phase Induction motors

Operating principle of single phase induction motors, Equivalent circuit

Control systems – I
Mathematical modeling and representation of systems, Feedback principle, transfer function, Block diagrams and Signal flow graphs

**Control systems – II**

Transient and Steady-state analysis of linear time invariant systems, Routh-Hurwitz and Nyquist criteria, Bode plots, Root loci, Stability analysis

**Control systems – III**

Lag, Lead and Lead-Lag compensators; P, PI and PID controllers; State space model, State transition matrix.
Course Objectives:

- To study the development of impedance diagram and formation of $Y_{\text{bus}}$.
- To study the concept of the $Z_{\text{bus}}$ building algorithm.
- To study the importance of per unit and short circuit calculation for symmetrical faults.
- To study the effect of unsymmetrical faults.
- To study the Gauss Seidel load flow method.
- To study the Newton raphson, decoupled and fast decoupled load flow methods.

Course Outcomes:

- Able to draw an impedance diagram for a power system network and also formation of $Y_{\text{bus}}$.
- Able to formulate the $Z_{\text{bus}}$ for a power system network.
- Able to know the importance of per unit system and determine the symmetrical fault analysis for a balanced power system.
- Able to find out the sequence components of currents for any unbalanced power system network.
- Able to find out the load flow solution of a power system network using Gauss Seidel method.
- Able to find out the load flow solution of a power system network using N-R, Decoupled and fast decoupled methods.
UNIT – I POWER SYSTEM NETWORK MATRICES – I
Graph Theory: Definitions, Bus Incidence Matrix, $Y_{bus}$ formation by Direct and Singular Transformation Methods–Numerical Problems.

UNIT – II POWER SYSTEM NETWORK MATRICES – II
Formation of $Z_{bus}$: Concept of primitive network, Partial network, Algorithm for the Modification of $Z_{bus}$, for addition element for the following cases (without mutual coupling): Addition of element from a new bus to reference node, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference node and Addition of element between two old buses (Derivations and Numerical Problems).

UNIT – III PER UNIT SYSTEM AND SYMMETRICAL FAULT ANALYSIS:
Per-Unit System of Representation: Per-Unit equivalent reactance network of a three phase Power System–Numerical Problems.

UNIT-IV UN SYMMETRICAL FAULT ANALYSIS:
UNIT - V POWER FLOW STUDIES-I
Necessity of Power Flow Studies, data for power flow studies, derivation of static load flow equations, load flow solutions using Gauss Seidel Method algorithm and flowchart – Numerical problems (Max. 3-Buses)

UNIT - VI POWER FLOW STUDIES-II
Load flow Solution using Newton Raphson Method in Rectangular and Polar co-ordinates, algorithm and flowchart, Decoupled and Fast Decoupled Methods, algorithm and flowchart – Numerical problems (Max. 3-Buses).

TEXT BOOKS:

REFERENCE BOOKS:

WEB LINKS
1. elearning.vtu.ac.in/EE61.html
2. nptel.ac.in/courses/108105067/
Course Objectives:

- To learn the fundamentals of electric drive and different electric braking methods.
- To analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.
- To discuss the converter control of dc motors in various quadrants
- To understand the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
- To learn the principles of static rotor resistance control and various slip power recovery schemes.
- To understand the speed control mechanism of synchronous motors

Course Outcomes:
The students are able to

- Explain the fundamentals of electric drive and different electric braking methods.
- Analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.
- Explain the converter control of dc motors in various quadrants
• Explain the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
• Explain the principles of static rotor resistance control and various slip power recovery schemes.

UNIT-I: SINGLE PHASE CONVERTER CONTROLLED DC MOTORS

UNIT-II: THREE PHASE CONVERTER CONTROLLED DC MOTORS
Revision of speed control techniques – Separately excited and series motors controlled by semi and full converters – Output voltage and current waveforms (continuous current conduction mode only) – Speed-torque expressions – Speed-torque characteristics – Numerical problems – Four quadrant operation using dual converters.

UNIT-III: CONTROL OF DC MOTORS BY DC-DC CONVERTERS
Single quadrant – Two quadrant and four quadrant chopper fed separately excited and series excited motors – Continuous current operation– Output voltage and current waveforms – Speed-torque expressions – Speed-torque
characteristics -- Closed loop operation (Block diagrams only).

UNIT-IV: INDUCTION MOTOR CONTROL – STATOR SIDE
Variable voltage characteristics–Control of Induction Motor by AC Voltage Controllers – Waveforms –Speed torque characteristics– Variable Voltage Variable Frequency control of induction motor by voltage source inverter – PWM control – Closed loop operation of induction motor drives (Block Diagram Only).

UNIT-V: CONTROL OF INDUCTION MOTOR – ROTOR SIDE

UNIT-VI: CONTROL OF SYNCHRONOUS MOTORS
Separate control & self control of synchronous motors – Operation of self controlled synchronous motors by VSI– Closed Loop control operation of synchronous motor drives (Block Diagram Only).

TEXT BOOKS:
  2. Solid state Drives-by J.Gnanavadivel, J.Karthikeyan and B.San thi, Anuradha publications.

REFERENCE BOOKS:
2. Power Electronic Circuits, Devices and applications by M.H. Rashid, PHI.

WEB LINKS
1. https://www.jntubook.com/power-semiconductor-drives-textbook-free-d...
   www.nptel.ac.in/downloads/108105066/
2. www.slideshare.net/saimanoj018/power-electronic-drives-ppt
Course Objectives:
- To study the principle of operation and working of different types of instruments. Measurement of voltage and current.
- To understand the principle of operation and working of dc and ac potentiometers.
- To study the working principle of operation of different types of instruments for measurement of power and energy.
- To understand the principle of operation and working of various types of bridges for measurement of parameters – resistance, inductance, capacitance and frequency.
- To study the principle of operation and working of various types of magnetic measuring instruments.
- To study the applications of CRO for measurement of frequency, phase difference and hysteresis loop using Lissajous patterns

Course Outcomes:
- Able to choose right type of instrument for measurement of voltage and current for ac and dc.
- Able to choose right type of instrument for measurement of power and energy – able to calibrate energy meter by suitable method
- Able to calibrate ammeter and potentiometer.
- Able to select suitable bridge for measurement of electrical parameters
- Able to use the ballistic galvanometer and flux meter for magnetic measuring instruments.
- Able to measure frequency and phase difference between signals using CRO. Able to use digital instruments in electrical measurements.

UNIT-I Measuring Instruments
Classification – deflecting, 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-attracted disc type – Extension of range of E.S. Voltmeters.

UNIT –II Instrument transformers, Potentiometers
CT and PT – Ratio and phase angle errors - Principle and operation of D.C. Crompton’s potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type’s standardization – applications

UNIT –III Measurement of Power, Power factor

UNIT –IV Measurement of Energy and Special meters

UNIT – V Resistance Measurements, A.C Bridges

UNIT – VI Digital Meters

TEXT BOOKS:
3. Electrical and Electronic Measurements and instrumentation by R.K.Rajput, S.Chand

REFERENCE BOOKS:
1. Electrical Measurements – by Buckingham and Price, Prentice – Hall
2. Electrical Measurements by Harris.

WEB LINKS
1. www.studynamama.com/.../325-Electrical-measurements-Instrumentation-p..
2. www.faadooengineers.com/.../9440-Electronic-Measurements-Instrumen..
SWITCHGEAR AND PROTECTION
III B.TECH II SEM

Course Objectives:

- To provide the basic principles protective schemes for electrical apparatus, relay terminology.
- To study different types of over voltages in a power system and principles of different protective schemes for insulation co-ordination.
- To study the classification, operation, construction and application of different types of electromagnetic protective relays.
- To provide the basic principles of arc interruption, circuit breaking principles, operation of various types of circuit breakers.
- To explain various types of faults in generators and transformers, feeders and bus bars and different types of protective schemes.

Course Outcomes:
The Students are able to

- Understand the principles of protection and protection terminology and definitions.
- Understand the different types of over voltages in a power system and principles of different protective schemes for insulation co-ordination.
- Classify types of electromagnetic protective relays, its operation, construction and applications.
• Understand basic principles of arc interruption, circuit breaking principles, operation of various types of circuit breakers.
• Understand the various types of faults in generators and transformers, feeders and bus bars and different types of protective schemes

UNIT I CIRCUIT BREAKERS
Elementary principles of arc interruption–Restrike Voltage and Recovery voltages– Average and Max. RRRV–Resistance switching–current chopping-Bulk Oil and Minimum oil circuit breakers– Description and operation of Air Blast– Vacuum and SF₆ circuit breakers– CB ratings.

UNIT–II ELECTROMAGNETIC PROTECTION

UNIT–III:
GENERATOR PROTECTION
Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection– Numerical examples.

TRANSFORMER PROTECTION
UNIT-IV:  
**Feeder and Bus bar Protection**  

UNIT-V:  
**STATIC AND DIGITAL RELAYS**  

UNIT-VI:  
**Protection against over voltage and grounding**  

TEXT BOOKS:  
REFERENCES:

WEB LINKS
1. www.nptel.ac.in/downloads/108101039/
2. www.ece.uidaho.edu/ee/power/ECE525/
3. www.electrical4u.com/protection-system-in-power-system/
Course Objectives:
- To study the modelling of synchronous generator, transformers and transmission lines.
- To study the transient on transmission lines.
- To study the constructional details and classification of cables with necessary numerical calculations.
- To study the steady state stability analysis of power systems.
- To study the transient and dynamic stability analysis of power systems.
- To study the concept of stability of transmission system.

Course Outcomes:
The Students are able to
- Model the generator, transformers and transmission lines.
- Identify single core and multi core cables with different insulating materials.
- Understand the surge propagation, reflection and refraction in transmission lines.
- Able to analyze the steady state stability concepts of a power system.
- Able to analyze the transient and dynamic stability concepts of a power system.
• Able to analyze the voltage stability concept of transmission systems.

UNIT – I MODELLING OF POWER SYSTEM COMPONENTS:
Introduction, Synchronous generators, Generator model, Power angle characteristics, Per phase model of three phase transformer, Auto transformer, Auto transformer model, modelling of transmission lines.

UNIT – II POWER SYSTEM TRANSIENTS:

UNIT – III UNDERGROUND CABLES

UNIT -VI POWER SYSTEM STABILITY ANALYSIS -I
UNIT -V POWER SYSTEM STABILITY ANALYSIS -II


UNIT -VI VOLTAGE STABILITY:

Concept of Stability of Transmission System, Definition and classification of voltage stability, Mechanism of voltage collapse, Analytical concept of voltage stability for a two-bus system, Expression for critical receiving end voltage and critical power angle at voltage stability limit for a two-bus power system, Relation of voltage stability and rotor angle stability, Factors affecting voltage stability.

TEXT BOOKS:

REFERENCE BOOKS:

WEB LINKS
1. elearning.vtu.ac.in/EE61.html
2. nptel.ac.in/courses/108105067/
INTELLECTUAL PROPERTY RIGHTS AND PATENTS
III B.TECH II SEM

Course Objectives:
7. To create an awareness on intellectual property rights and patents
8. To Understand Rights of an inventor from infringement and its remedies.
9. To identify the issues related to intellectual property.
10. To know the procedure to obtain the rights of and obligations of intellectual property.
11. To know about cybercrimes and how they are done.

Course Outcomes:
At the end of this course student should be able to:
- Use intellectual property and understand the nature and purpose of rights
- Recognize the information conveyed in intellectual property rights and the way it is used by inventors, creators and owners.
- Know about Cybercrimes and how to secure the data.

Unit I
Unit II
Introduction to Copyrights – Principles of Copyright- Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works – Rights of Distribution – Rights of performers – Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law

Unit III

Unit IV

Unit V
Unit VI

REFERENCE BOOKS:

1. Deborah E.Bouchoux: "Intellectual Property”. Cengage learning, New Delhi
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
Course Objectives:

- To study the characteristics of SCR, MOSFET & IGBT and their firing circuits of SCR
- To analyze the AC voltage controller wave forms with different loads and firing angles
- To analyze the forced commutation circuits using SCRs
- To analyze the wave forms of Inverters, Rectifiers, and Cycloconverters

Course Outcomes:
The Students are able to

- Plot the characteristics of SCR, MOSFET & IGBT and their firing circuits of SCR
- Draw AC voltage controller wave forms with different loads and firing angles
- Understand forced commutation circuits using SCR’s.
- Draw the wave forms of Inverters, Rectifiers, and Cycloconverters

Any 10 of the following experiments are required to be conducted
1. Study of characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits for SCR’s
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E)
6. Chopper controlled DC motor
7. Single Phase Parallel, inverter with R and RL loads
8. Single Phase cyclo converter with R and RL loads
9. Single Phase half controlled converter with R load
10. Three Phase half controlled bridge converter with R-load
11. Single Phase series inverter with R and RL loads
12. Single Phase Bridge inverter with R and RL loads
13. Single Phase dual converter with RL loads

Any 2 of the following experiments are required to be conducted
1. PSPICE simulation of single-phase full converter using RLE loads
2. PSPICE simulation of single-phase AC Voltage controller using RLE loads.
3. PSPICE simulation of resonant pulse commutation circuit and Buck chopper.
4. PSPICE simulation of single phase Inverter with PWM control.

REFERENCE BOOKS:
2. PSPICE A/D user’s manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user’s manual and – Mathworks, USA.

WEB LINKS
1. www.srmuniv.ac.in/.../power%20electronics%20lab%20manual-withoutr...
2. www.eeccube.com/2012/.../ee2304-power-electronics-laboratory-lab.ht...
ELECTRICAL MEASUREMENTS LAB
III B.TECH II SEM

L T P C
0 0 4 2

Course Objectives:
• To calibrate single phase energy meter, power factor meter, DC Potentiometer, PMMC ammeter, Voltmeter
• To measure the resistance, inductance and capacitance using bridges.
• Measurement of 3 phase reactive power
• To test the C.T and P.T

Course Outcomes:
The Students are able to
• To calibrate single phase energy meter, power factor meter, DC Potentiometer, PMMC ammeter, Voltmeter
• To measure the resistance, inductance and capacitance using bridges.
• Measurement of 3 phase reactive power
• To test the C.T and P.T

Any 10 of the following experiments are required to be conducted
1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
5. Capacitance measurement using Schering Bridge
6. Inductance measurement using Anderson’s Bridge
7. Measurement of 3 phase reactive power with single-phase wattmeter for balanced loading
8. Measurement of complex power with Trivector meter and verification
9. Optical bench- Determination of polar curve measurement of MHCP of filament lamps
10. Calibration LPF wattmeter – by Phantom testing
11. Measurement of 3 phase power with single wattmeter and 2 No’s of CT’s.
12. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given C.T. by Null method
13. P.T. testing by comparison – V.G. as Null detector – Measurement of % ratio error and phase angle of the given P.T.
14. Dielectric oil testing using H.T. testing Kit
15. LVDT and capacitance pickup – characteristics and Calibration
16. Resistance strain gauge – strain measurements and Calibration
17. Polar curve using Lux meter, Measurement of intensity of illumination of fluorescent lamp
18. Transformer turns ratio measurement using A.C. Bridge.

WEB LINKS
1. www.aurora.ac.in/...manuals/lab-manual/electrical-measurment/electrical-...
www.alljntuworl.in › File
SKILL DEVELOPMENT-III  
(DISCIPLINE CENTRIC)  
DESIGN OF PRINTED CIRCUIT BOARD-III  
III B.TECH II SEM  

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**Course Outcomes:**
1. Familiarization of PCB Circuit Terminology and able to design a circuit and create a schematic Capture  
2. Become proficient with computer skills (eg., Power logic and Power PCB) for drawing Schematic and PCB Layout  
3. To Create PCB Art work and CAM Files  
4. To Create New part and to Fabricate a Prototype PCB

**Course Objectives**
1. Become familiar with the simulation software  
2. Learn to use Power logic and power PCB  
3. Setup parameters, simulate and Generate CAM Files

**List of experiments:**
1. Routing techniques with specialized router  
2. Routing for single and double side PCB  
3. Editing, fine routing with mitree  
4. Care about ground pour for High amp tracks  
5. Care about critical signals like crystal routs, Differential pair routings  
6. DRC rules checking for Routing and assembly files  
7. Excellon and RS475 formats  
8. Generate gerber files for all layers Electrical/Non-electrical layers.  
9. Introduction about Cam350
10. Gerber verification using Cam350. (Manufacture outputs)

**Weblinks:**
1. [https://learn.sparkfun.com/tutorials/pcb-basics](https://learn.sparkfun.com/tutorials/pcb-basics)

**References:**
1. Printed Circuit Board Designer's Reference: Basics By Christopher T.Robertson
2. Electronics Devices And Circuits By A.P.Godse, U.A.Bakshi
SKILL DEVELOPMENT-III
(DISCIPLINE CENTRIC)
MATLAB PROGRAMMING-III
III B.TECH II SEM

L P C
1 2 2

COURSE OBJECTIVES:

- To know about MATLAB programming.
- To know about Simulink Library.
- To know about Matrix operations in MATLAB.
- To know about conditional statements in MATLAB.
- To know about plotting function in MATLAB.

List of experiments:

1. Diode clamped multi level inverter model.
2. Neutral point clamped multi level inverter model.
3. Five level cascaded H bridge inverter model.
4. 7 level Diode clamped multi level inverter model.
5. 9 level Diode clamped multi level inverter model.
6. 7 level cascaded H bridge inverter model.
7. 9 level cascaded H bridge inverter model.
8. Five level inverter with PV.
9. Different connections of Multi level inverter.

COURSE OUTCOMES:
• Able to know about MATLAB programming.
• Able to know about Simulink Library.
• Able to know about Matrix operations in MATLAB.
• Able to know about conditional statements in MATLAB.
• Able to know about plotting function in MATLAB.
• Able to know about working of inverters rectifiers and choppers.
SKILL DEVELOPMENT-III
(DISCIPLINE CENTRIC)
ADVANCED JAVA
III B.TECH II SEM

L   P   C
1   2   2

Objectives:

- Using Graphics, Animations and Multithreading for designing Simulation and Game based applications.
- Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
- Design and develop Web applications

List of Experiments

1. Study the basics of Java Programming
   a. Console Based Programming
   b. Applets
   c. Java Beans
   d. Servlets

2. Study the basics of Web design
   a. Html & Dhtml
   b. Java Script
   c. ASP

3. Program to demonstrate constructor overloading and use of static members and block.
4. Program to implement multilevel inheritance and method overriding.
5. Program to illustrate class member access for packages and also implement interfaces.
6. Program for exception handling using multiple catch statements and also create your own exception.
7. Program to implement 3 threads such that first sleep for 200 ms, for 400 ms and third for 600 ms.
8. Program to create an applet of a moving banner.
9. Program to create a calculator.
10. Program to create a chatting application
11. Program to create a servlet in which user enters a name in edit box, after pressing submit button the name will be displayed on the next page
12. Program to create your own resume by using HTML

Learning Outcomes:

Students should be able to-

- learn the Internet Programming, using Java Applets
- create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings
- apply event handling on AWT and Swing components.
- learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
- create dynamic web pages, using Servlets and JSP.
- make a reusuable software component, using Java Bean.
Recommended Books


4. HTML: The complete Reference,Thomas A Powell
POWER SYSTEMS-I

Power generation concepts-Thermal, hydal, nuclear and gas power generating systems.

POWER SYSTEMS-II

AC and dC transmission concepts, Models of transmission lines, Steady state performance of transmission lines.

POWER SYSTEMS-III

Voltage control and power factor correction, Underground Cables, Overhead insulators, Distribution systems.

POWER ELECTRONICS-I
Characteristics of semiconductor power devices—Diode, Thyristor, Triac, GTO, MOSFET, and IGBT.

**POWER ELECTRONICS-II**

Single and three phase configuration of uncontrolled rectifiers,

**POWER ELECTRONICS-III**

DC to DC conversion—Buck, Boost and Buck-Boost converters, Single phase and three phase inverters.
IV B.TECH I SEM

UTILISATION OF ELECTRIC POWER

Objectives:

✓ Able to identify most appropriate heating or welding techniques for suitable applications.
✓ Able to understand various level of illuminosity produced by different illuminating sources.
✓ Able to identify a suitable motor for electric drives and industrial Applications.

Outcomes:

✓ Able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.
✓ Able to determine the speed/time characteristics of different types of traction motors.
✓ Able to estimate energy consumption levels at various modes of operation.

UNIT – I
Electric Heating
Advantages and methods of electric heating–Resistance heating induction heating and dielectric heating.

Electric Welding
Electric welding–Resistance and arc welding–Electric welding equipment– Comparison between AC and DC Welding

UNIT – II
Illumination fundamentals
Introduction, terms used in illumination–Laws of illumination–Polar curves– Integrating sphere–Lux meter–Sources of light

UNIT – III

Various Illumination Methods
Discharge lamps, MV and SV lamps – Comparison between tungsten filament lamps and fluorescent tubes–Basic principles of light control– Types and design of lighting and flood lighting–LED lighting.

UNIT – IV

Selection of Motors
Choice of motor, type of electric drives, starting and running characteristics– Speed control–Temperature rise–Applications of electric drives–Types of industrial loads–continuous–Intermittent and variable loads–Load equalization.

UNIT – V

Electric Traction – I
System of electric traction and track electrification– Review of existing electric traction systems in India– Special features of traction motor– Mechanics of train movement–Speed–time curves for different services – Trapezoidal and quadrilateral speed time curves.

UNIT – VI

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–Principles of energy efficient motors.

TEXT BOOKS
1. C.L. Wadhwa, ‘Generation, Distribution and Utilization

REFERENCES

WEB LINKS
2. www.scoopworld.in
3. https://www.vidyarthiplus.com/.../Thread-EE2451-EEGUC-Lecture-Note...
Objectives:

- To understand optimal dispatch of generation with and without losses.
- To study the optimal scheduling of hydro thermal systems.
- To study the optimal unit commitment problem.
- To study the load frequency control for single area system
- To study the PID controllers for single area system and two area system.
- To understand the reactive power control and compensation of transmission lines

Outcomes:

- Able to compute optimal scheduling of Generators.
- Able to understand hydrothermal scheduling.
- Understand the unit commitment problem.
- Able to understand importance of the frequency.
- Understand importance of PID controllers in single area and two area systems.
- Will understand reactive power control and line power compensation.

UNIT - I ECONOMIC DISPATCH OF THERMAL STATIONS

Statement of economic dispatch problem– input-output characteristics - cost of generation – heat rate Curve – Cost Curve – Incremental fuel and Production costs – co-
ordination equations without loss and with loss – Loss Coefficients, General transmission line loss formula – solution by direct method and \( \lambda \)-iteration method.

UNIT – II HYDROTHERMAL SCHEDULING

UNIT III UNIT COMMITMENT
Statement of Unit Commitment problem – need for unit commitment – cost function formulation – constraints; spinning reserve, thermal unit constraints, hydro constraints, fuel constraints and other constraints – unit commitment solution; enumeration method, Priority list method

UNIT –IV MODELING OF SPEED GOVERNOR, TURBINE, GENERATOR & CONTROL UNITS

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

UNIT – VI REACTIVE POWER CONTROL
Basics of reactive power control – need for reactive power control – generation and absorption of reactive power –
Reactive Power compensation in transmission systems – shunt and Series Compensation – advantages and disadvantages of different types of compensating equipment for transmission systems; load compensation – Specifications of load compensator.

TEXT BOOKS
5. R. Chandrashekar Reddy, Power System Operation and Control, PHI Publications.

REFERENCES
WEB LINKS
1. www.nptel.ac.in/downloads/108101040/
2. elearning.vtu.ac.in/06EE82.html
3. www.studynam.com/.../337-Power-system-operation-control-pdf-downl...
IV B.TECH I SEM

MICROPROCESSORS AND MICROCONTROLLERS  L   T   P   C
                                               2   1   0  3

Course Objectives:
The student will
✓ learn concepts of microprocessor, different addressing modes and programming of 8086.
✓ understand interfacing of 8086, with memory and other peripherals.
✓ learn concept of DMA, USART RS-232 and PIC controller.
✓ study the features of advanced processors and Pentium processors.
✓ study the features of 8051 Microcontroller, its instruction set and also other controllers.

Course Outcomes:
After going through this course the student will be able to
✓ Develop programs for different addressing modes.
✓ Perform 8086 interfacing with different peripherals and implement programs.
✓ Describe the key features of serial and parallel communication and able to
✓ Design a microcontroller for simple applications.

UNIT I: 8-bit microprocessor (8085): architecture, programming, memory and I/O interfacing.
UNIT-II: 8086/8088 MICROPROCESSORS Register organization of 8086, Architecture, signal description of 8086Minimum mode, maximum mode of 8086 system and
timings, addressing mode of 8086, instruction set off 8086, assembler directives and operators.

UNIT-III: PROGRAMMING WITH 8086 MICROPROCESSOR Machine level programs, programming with an assembler, Assembly language programs,

UNIT-IV: BASIC AND SPECIAL PURPOSE PROGRAMMABLE PERIPHERALS AND THEIR INTERFACING WITH 8086/88 Semiconductor memory interfacing, dynamic RAM interfacing, interfacing i/o ports, PIO 8255 modes of operation of 8255, interfacing to D/A and A/D converters, stepper motor interfacing, Programmable interrupt controller 8259A, programmable communication interface 8251 USART, DMA Controller 8257.

UNIT-V: 8051 MICROCONTROLLER Introduction to microcontrollers, 8051 Microcontrollers, 8051 pin description, connections, I/O ports and memory organization, MCS51 addressing modes and instructions, assembly language programming tools.


TEXT BOOKS:
REFERENCES:


Objectives:

This course is intended to familiarise the students with the framework for the managers and leaders available for understanding and making decisions relating to issues related organisational structure, production operations, marketing, Human resource Management, product management and strategy.

Outcomes:

By the end of the course, the student will be in a position to

- Plan an organizational structure for a given context in the organisation carry out production operations through Work study.
- Carry out production operations through Work study.
- Understand the markets, customers and competition better and price the given products appropriately.
- Ensure quality for a given product or service.
- Plan and control the HR function better.
- Plan, schedule and control projects through PERT and CPM.
- Evolve a strategy for a business or service organisation.

UNIT - I:

UNIT – II:


UNIT – III:


UNIT – IV:


Electronics & Communication Engineering

UNIT – V:

UNIT - VI:

TEXT BOOKS

REFERENCES
Web links

IV B.TECH I SEM

FLEXIBLE AC TRANSMISSION SYSTEMS  L  T  P  C
(Elective-I)  2  1  0  3

Course Objectives:
✓ To learn the basics of power flow control in transmission lines by using FACTS controllers.
✓ To explain the operation and control of voltage source converter.
✓ To discuss compensation methods to improve stability and reduce power oscillations in the transmission lines.
✓ To learn the method of shunt compensation by using static VAR compensators.
✓ To learn the methods of compensation by using series compensators.
✓ To explain the operation of two modern power electronic controllers (Unified Power Quality Conditioner and Interline Power Flow Controller).

Course Outcomes:
✓ Determine power flow control in transmission lines by using FACTS controllers.
✓ Explain operation and control of voltage source converter.
✓ Discuss compensation methods to improve stability and reduce power oscillations in the transmission lines.
✓ Explain the method of shunt compensation by using static VAR compensators.
✓ Appreciate the methods of compensations by using series compensators.
✓ Explain the operation of modern power electronic controllers (Unified Power Quality Conditioner and...
Interline Power Flow Controller).

UNIT I: FACTS CONCEPTS
Transmission interconnections-Power flow in an AC system-Loading capability limits-Dynamic stability considerations-Importance of controllable parameters-Basic types of FACTS controllers-Benefits from FACTS controllers.

UNIT II: VOLTAGE SOURCE CONVERTERS

UNIT III: STATIC SHUNT COMPENSATION

UNIT IV: SVC AND STATCOM
The regulation and slope transfer function –Dynamic Performance- Transient stability enhancement and power oscillation damping – Operating point control Summary of compensator control.

UNIT V: STATIC SERIES AND COMBINED COMPENSATORS
Static Series Compensators Concept of series capacitive compensation – Improvement of transient stability – Power
oscillation damping - Functional requirements - GTO thyristor controlled Series Capacitor (GSC) - Thyristor Switched Series Capacitor (TSSC) - Thyristor Controlled Series Capacitor (TCSC) - Static Synchronous Series Compensator (SSSC) - Control schemes for GSC, TSSC, TCSC and SSSC. Combined Compensators: Operation of Unified Power Flow Controller (UPFC) and Interline Power Flow Controller (IPFC).

UNIT VI: FACTS CONTROLLERS
Basic types of FACTS Controllers. Control schemes for GTO thyristor controlled Series Capacitor (GSC) - Thyristor Switched Series Capacitor (TSSC) - Thyristor Controlled Series Capacitor (TCSC) - Static Synchronous Series Compensator (SSSC)

TEXT BOOKS:
2. Reactive Power Control in Electric Systems by T.J.E. Miller, John Wiley & sons

REFERENCES:

WEB LINKS:
1. www.nptel.ac.in/
2. elearning.vtu.ac.in/
UNIT-I: STATE VARIABLE ANALYSIS:

Choice of state variables in Electrical networks - Formulation of state equations for Electrical networks - Equivalent source method and network topological method.

UNIT-II TESTING OF POLYNOMIALS:

Elements of realisibility- Hurwitz polynomials- positive real functions- properties-Testing-Sturm’s Test, examples.

UNIT-III NETWORK SYNTHESIS:

Network Synthesis:
Synthesis of one port LC networks - Foster and Cauer methods- Synthesis of RL and RC one port network- Foster and Cauer methods.

UNIT-IV LAPLACE TRANSFORMS AND APPLICATIONS:

Applications of Laplace transform method of Analysis-Response of RL, RC, RLC Networks to Step, Ramp and impulse functions, Shifting Theorem- Convolution Integral-Applications.
UNIT-V APPLICATIONS OF FOURIER SERIES AND FOURIER TRANSFORM REPRESENTATION:
Introduction, Effective value and average values of non-sinusoidal periodic waves, currents, power factor. Application in circuit analysis, Circuit analysis using Fourier series.

UNIT - VI PASSIVE FILTERS:
Introduction, properties, classification, constant ‘K’ filter-low pass-High pass-Band pass-Band Stop filters, ‘m’ derived filter- low pass-High pass-Band pass-Band Stop filters, comparision of constant ‘K’ and ‘m’ derived filters

TEXT BOOKS:

REFERENCE BOOKS:
2. Network and Systems- D. Roy Chowdhary, New Age International.

WEB LINKS:
1. elearning.vtu.ac.in/
2. nptel.ac.in/
IV B.TECH I SEM

EMBEDDED SYSTEMS
(Elective – I)

Course Objectives:

- Understand the building blocks of typical embedded system and different memory technology and memory types.
- Learn the characteristics of an embedded system, quality attributes of embedded systems, application specific and domain specific embedded system,
- Learn about communication devices and basics about VLSI and integrated circuit design and learn concept of firmware design approaches, ISR concept. Interrupt sources, interrupt servicing
- mechanism, multiple interrupts,
- Understand the concepts of c versus embedded c and compiler versus cross-compiler. Learn about the integrated development environment, software utility tool. Also learn about quality assurance and testing of the design, testing on host machine, simulators.

Course Outcomes:

After going through this course the student will be able to

- Know basics of embedded system, classification, memories, different communication interface and what embedded firmware is and its role in embedded system, different system components.
- Distinguish all communication devices in embedded system, other peripheral device.
- Distinguish concepts of C versus embedded C and compiler versus cross-compiler.
Choose an operating system, and learn how to choose an RTOS

Unit-I:
Introduction: Embedded System-Definition, History, Classification, application areas and purpose of embedded systems, The typical embedded system-Core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, PCB and passive components. Characteristics, Quality attributes of an Embedded systems, Application-specific and Domain-Specific examples of an embedded system.

Unit-II:
Embedded Hardware Design: Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

Unit-III:
Embedded Firmware Design: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

Unit-IV:
Real Time Operating System: Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Threads, Processes and Scheduling, Task Scheduling, Communication, Synchronization, Device Drivers, How to choose an RTOS.

Hardware Software Co-Design: Fundamental Issues in Hardware Software Co-Design, Computational models in
embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

Unit-V:
**Embedded System Development:** The integrated development environment, Types of files generated on cross-compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

Unit-VI:
**Embedded System Implementation And Testing:** The main software utility tool, CAD and the hardware, Translation tools-Pre-processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

**Text Books:**

**References:**
2. Embedding system building blocks By Labrosse, CMP publishers.
IV B.TECH I SEM

DESIGN OF ELECTRICAL MACHINES  L  T  P  C
                                   2  1  0  3

(Elective – I)

Course Objectives:
✓ To provide sound knowledge about constructional details and design of various electrical machines.
✓ To study mmf calculation and thermal rating of various types of electrical machines. To design armature and field systems for D.C. machines.
✓ To design core, yoke, windings and cooling systems of transformers.
✓ To design stator and rotor of induction machines.
✓ To design stator and rotor of synchronous machines and study their thermal modeling.

Course Outcomes:
✓ To be able to acquire knowledge about constructional details and design of DC and AC machines.
✓ To be able to calculate electric and magnetic loadings of DC and AC machines.
✓ To develop knowledge of design of windings in DC and AC machines.
✓ Able to design the cooling tank of and calculation of temperature rise in a transformer.
✓ Able to design stator and rotor of 3-phase induction motor and alternator of salient pole type.

UNIT I INTRODUCTION:

UNIT II DC MACHINES:

UNIT III TRANSFORMERS:

UNIT IV INDUCTION MOTORS-I:

UNIT V INDUCTION MOTORS-II:
Design of wound rotor – Magnetic leakage calculations – Leakage reactance of polyphase machines- Magnetizing current – Short circuit current (Blocked rotor currents).

UNIT VI SYNCHRONOUS MACHINES:

**TEXT BOOKS:**

**REFERENCES:**

**WEB LINKS**
1. www.nptel.ac.in/
2. elearning.vtu.ac.in/
IV B.TECH I SEM

HIGH VOLTAGE ENGINEERING

(Elective – I)

Course Objectives

✓ To understand electric field distribution and computation in different configuration of electrode systems.
✓ To understand HV breakdown phenomena in gases, liquids and solids dielectric materials.
✓ To acquaint with the generating principle of operation and design of HVDC, AC and Impulse voltages and impulse currents.
✓ To understand various techniques of AC, DC and Impulse measurement of high voltages and currents.
✓ To understand the insulating characteristics of dielectric materials.
✓ To understand the various testing techniques of HV equipments.
✓ To be acquainted with the performance of high voltages with regard to different configurations of electrode systems.

Course Outcomes:

✓ To be able to understand theory of breakdown and withstand phenomena of all types of dielectric materials.
✓ To acquaint with the techniques of generation of AC, DC and Impulse voltages.
✓ To be able to apply knowledge for measurement of high voltage and high current AC, DC and Impulse.
✓ To be in a position to measure dielectric property of material used for HV equipment.
✓ To know the techniques of testing various equipment’s used in HV engineering.

UNIT-I OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS
Causes of over voltages and its effects on power system – Lightning, switching surges and temporary over voltages – protection against over voltages – Bewley’s lattice diagram.

UNIT-II ELECTRICAL BREAKDOWN IN GASES, SOLIDS AND LIQUIDS
Gaseous breakdown in uniform and non-uniform fields – Corona discharges – Vacuum breakdown – Conduction and breakdown in pure and commercial liquids – Breakdown mechanisms in solid and composite dielectrics.

UNIT-III GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS
Generation of High DC, AC, impulse voltages and currents. Tripping and control of impulse generators.

UNIT-IV MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS
Measurement of High voltages and High currents – Digital techniques in high voltage measurement.

UNIT-V HIGH VOLTAGE TESTING & INSULATION COORDINATION
High voltage testing of electrical power apparatus – Power frequency, impulse voltage and DC testing – International and Indian standards – Insulation Coordination.

UNIT-VI ELECTRO STATIC APPLICATIONS:
Electrostatic Precipitator, Electro Static Separator, Electro Static Coating, Electro Static Copying, Pulsed Power.

**TEXT BOOK**

**REFERENCES**

**WEB LINKS**
1. www.nptel.ac.in/
2. elearning.vtu.ac.in/
Course Objectives:
✓ To formulate Y Bus, Z Bus Algorithm and determination of ABCD parameters
✓ To determine the Load frequency of single and two area system using MATLAB/Simulink
✓ Determine the load flow using Gauss-Seidel method, NR method, and fast decoupled methods.

Course Outomes
The students are able
✓ To formulate Y Bus, Z Bus Algorithm and determination of ABCD parameters
✓ To determine the Load frequency of single and two area system using MATLAB/Simulink
✓ Determine the load flow using Gauss-Seidel method, NR method, and fast decoupled methods

Any 10 of the following experiments are to be conducted

List of Experiments:

2. Y Bus formation for p systems with and without mutual coupling, by inspection method.
3. Determination of bus currents, bus power and line flow for a specified system voltage (Bus) Profile
5. ABCD parameters: Formation for symmetric II/I configuration. Verification of AD-BC=1 Determination of coefficient and regulation
6. Load frequency control of single area system using MATLAB simulink.
7. Load frequency control of two area system using MATLAB simulink.
8. Write a program to perform load flow using Gauss-Seidel method
9. Load flow analysis using NR method (polar form)
10. Load flow analysis using NR method (rectangular form)
11. Fast decoupled flow method for both pq and pv buses.
12. Optimal Generator Scheduling for Thermal power plants.
13. Economic dispatch using lambda-iteration methods

WEB LINKS
www.slideshare.net/.../matlab-programs-power-system-simulation-lab-ele..
The students are required to develop the necessary Algorithm, Flowchart and Assembly Language Program Source Code for executing the following functions using MASM/TASM software and to verify the results with necessary Hardware Kits.

PART-I: MICROPROCESSOR 8086

1. Introduction to MASM/TASM.

2. Arithmetic operation- Multi byte Addition and Subtraction, Multiplication and Division-
   - Signed and unsigned Arithmetic operation, ASCII-Arithmetic operation.
   - Logic operations-Shift and rotate- Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
   - By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.

3. DOS/BIOS programming : Reading keyboard (Buffered with and without echo)
Display characters, Strings.

PART-II: INTERFACING WITH MICROPROCESSOR

1. 8259 – Interrupt Controller- Generate an interrupt using 8259 timer.

2. 8279 – Keyboard Display- Write a program to display a string of characters.

3. 8255 – PPI-Write ALP to generate sinusoidal wave using PPI.

4. 8251 – USART-Write a program in ALP to establish Communication between two processors.

PART-III: MICROCONTROLLER 8051:

1. Reading and Writing on a parallel port.

2. Timer in different modes.

3. Serial communication implementation.

PART-IV: INTERFACING WITH MICROCONTROLLER

Write C programs to interface 8051 chip to Interfacing modules to Develop single chip solutions.

1. Simple Calculator using 6 digit seven segment display and Hex Keyboard interface to 8051.

2. Alphanumeric LCD panel and Hex keypad input interface to 8051.
3. External ADC and Temperature control interface to 8051.

4. Generate different waveforms Sine, Square, Triangular, and Ramp etc. using DAC interface to 8051; change the frequency and Amplitude.

**EQUIPMENT REQUIRED FOR LABORATORY**

1. MASM/TASM software

2. 8086 Microprocessor Kits
   
   1. 8051 Micro Controller kits
   
   2. Interfaces/peripheral subsystems
      
      i) 8259 PIC
      
      ii) 8279-KB/Display
      
      iii) 8255 PPI
      
      iv) 8251 USART
      
      v) A/D and D/AC Interface
IV B.TECH II SEM

DIGITAL CONTROL SYSTEMS  L  T  P  C
(Elective-II)              2  1  0  3

Course Objectives

✓ To understand the concepts of digital control systems and assemble various components associated with it. Advantages compared to the analog type.
✓ The theory of $z$–transformations and application for the mathematical analysis of digital control systems.
✓ To represent the discrete–time systems in state–space model and evaluation of state transition matrix.
✓ To examine the stability of the system using different tests.
✓ To study the conventional method of analyzing digital control systems in the $w$–plane.
✓ To study the design of state feedback control by “the pole placement method.”

Course Outcomes

✓ The students learn the advantages of discrete time control systems and the “know how” of various associated accessories.
✓ The learner understand $z$–transformations and their role in the mathematical analysis of different systems (like laplace transforms in analog systems).
✓ The stability criterion for digital systems and methods adopted for testing the same are explained.
✓ Finally, the conventional and state–space methods of design are also introduced.
UNIT 1: Discrete data and digital Control Systems – basic elements, advantages and disadvantages, examples, Impulse sampling and data hold – transfer functions of Zero order hold and First order hold. Reconstructing original signals from sampled signals – sampling theorem, ideal low pass filter, frequency response characteristics of the Zero order hold.

UNIT 2: The Z-transform, Z transforms of some elementary functions, Important properties and theorems of the Z-transform, The inverse Z-transform, S-transform method for solving difference equations, the pulse transfer function, realization of digital controllers.

UNIT 3: Mapping between the s-plane and the z-plane, the Jury stability test, stability analysis by use of the bilinear transformation and Routh stability criterion. Lyapunov stability analysis of discrete time systems.


UNIT 5 Controllability, Observability, Principle of Duality, Design via pole placement necessary and sufficient condition. Ackerman’s formula, Dead Beat response.

UNIT 6 State observers – necessary and sufficient condition for state observation, full order state observer, minimum order state observer.
TEXT BOOK:

REFERENCE BOOKS:
3. Digital Control and State Variable Methods by M.Gopal, TMH

WEB LINKS:
1. www.nptel.ac.in/
2. learning.vtu.ac.in/
IV B.TECH II SEM

RENEWABLE ENERGY SOURCES
( ELECTIVE-II )

Course Objectives
✓ To study the solar radiation data, extra terrestrial radiation, radiation on earth’s surface.
✓ To study solar thermal collections.
✓ To study solar photo voltaic systems.
✓ To study maximum power point techniques in solar pv and wind.
✓ To study wind energy conversion systems, Betz coefficient, tip speed ratio.
✓ To study basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

Course Outcomes:
Student should be able to
✓ Analyze solar radiation data, extraterrestrial radiation, radiation on earth’s surface.
✓ Design solar thermal collections.
✓ Design solar photo voltaic systems.
✓ Develop maximum power point techniques in solar PV and wind.
✓ Explain wind energy conversion systems, Betz coefficient, tip speed ratio.
✓ Explain basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

UNIT-I: FUNDAMENTALS OF ENERGY SYSTEMS
UNIT-II: SOLAR THERMAL SYSTEMS

UNIT-III: SOLAR PHOTOVOLTAIC SYSTEMS
Balance of systems – IV characteristics – System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.

UNIT-IV: WIND ENERGY

UNIT-V: HYDRO AND TIDAL POWER SYSTEMS

UNIT-VI: BIOMASS, FUEL CELLS AND GEOTHERMAL SYSTEMS
TEXT BOOKS:

REFERENCE BOOKS:
3. Renewable Energy Technologies / Ramesh & Kumar / Narosa.
4. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.

WEB LINKS:
1. www.nptel.ac.in/
2. elearning.vtu.ac.in/
IV B.TECH II SEM

**VLSI DESIGN**

*(Elective-II)*

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**Course Objectives:**

- Use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnects.
- Learn the various fabrication steps of IC and come across basic electrical properties of MOSFET.
- Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect and to verify the functionality, timing, power and parasitic effects.
- The concepts and techniques of modern integrated circuit design and testing (CMOS VLSI).
- Design static CMOS combinational and sequential logic at the transistor level, including mask layout.

**Course Outcomes:**

- To understand the mathematical methods and circuit analysis models.
- To know various fabrication steps of IC design.
- To understand specific layout rules in the placement, interconnection etc.,
- To understand the techniques of new or modern IC design and testing.
- To understand the design of static CMOS combinational and sequential logic at the transistor level.

**UNIT I**

**INTRODUCTION:** Introduction to IC Technology - MOS, PMOS, NMOS, CMOS & BiCMOS technologies.
Oxidation, Lithography, Diffusion, Ion implantation, Metallisation, Encapsulation, Probe testing, Integrated Resistors and Capacitors.

UNIT II BASIC ELECTRICAL PROPERTIES : Basic Electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds, figure of merit o; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.


UNIT IV GATE LEVEL DESIGN : Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Basic circuit concepts, Sheet Resistance RS and its concept to MOS, Area Capacitance Units, Calculations - - Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers

UNIT V SUBSYSTEM DESIGN : Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters, High Density Memory Elements.
SEMICONDUCTOR INTEGRATED CIRCUIT DESIGN:
PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach

UNIT VICMOS TESTING:
CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chiplevel Test Techniques, System-level Test Techniques, Layout Design for improved Testability

TEXTBOOKS:


REFERENCES:


### UNIT-I: GENERATING SYSTEM RELIABILITY ANALYSIS

- Generation system model - capacity outage probability tables
- Recursive relation for capacitivemodel building
- Sequential addition method
- Unit removal
- Evaluation of loss of load and energy indices
- Examples.

### UNIT-II: GENERATING SYSTEM RELIABILITY ANALYSIS

- Frequency and Duration methods
- Evaluation of equivalent transitional rates of identical and non-identical units
- Evaluation of cumulative probability and cumulative frequency of non-identical generating units
- 2-level daily load representation - merging generation and load models
- Examples.

### UNIT-III: OPERATING RESERVE EVALUATION

- Basic concepts - risk indices
- PJM methods - security function approach
- Rapid start and hot reserve units
- Modelling using STPM approach
- Bulk Power System Reliability Evaluation: Basic configuration - conditional probability approach
- System and load point reliability indices
- Weather effects on transmission lines
- Weighted average rate and Markov model
- Common mode failures.
UNIT-IV: INTER CONNECTED SYSTEM RELIABILITY ANALYSIS

Probability array method – Two inter connected systems with independent loads – effects of limited and unlimited tie capacity – imperfect tie – Two connected Systems with correlated loads – Expression for cumulative probability and cumulative frequency.

UNIT-V: DISTRIBUTION SYSTEM RELIABILITY ANALYSIS – I (RADIAL CONFIGURATION):

UNIT-VI: DISTRIBUTION SYSTEM RELIABILITY ANALYSIS – II (PARALLEL CONFIGURATION)


REFERENCE BOOKS:

Course Objectives:

✓ To understand energy efficiency, scope, conservation and technologies.
✓ To design energy efficient lighting systems.
✓ To estimate/calculate power factor of systems and propose suitable compensation techniques.
✓ To understand energy conservation in HVAC systems.
✓ To calculate life cycle costing analysis and return on investment on energy efficient technologies.

Course Outcomes:

✓ Explain energy efficiency, conservation and various technologies.
✓ Design energy efficient lighting systems.
✓ Calculate power factor of systems and propose suitable compensation techniques.
✓ Explain energy conservation in HVAC systems.
✓ Calculate life cycle costing analysis and return on investment on energy efficient technologies.

UNIT-I BASIC PRINCIPLES OF ENERGY AUDIT AND MANAGEMENT

functions – Language – Questionnaire – Check list for top management.

UNIT II ENERGY EFFICIENT MOTORS:

UNIT III POWER FACTOR IMPROVEMENT:
Power factor- methods of improvement, location of capacitors, Power factor with non linear loads, effect of harmonics on power factor. Power factor controllers.

UNIT-IV SPACE HEATING AND VENTILATION

UNIT-V ECONOMIC ASPECTS AND ANALYSIS

UNIT-VI COMPUTATION OF ECONOMIC ASPECTS
TEXT BOOKS:


REFERENCE BOOKS:

6. Hand book on energy auditing. TERI (Tata Energy Research Institute)

WEB LINKS:
1. www.nptel.ac.in/
2. elearning.vtu.ac.in/
Course Objectives:

✓ To understand the phenomena of HVDC, HVDC equipment comparison with AC and the latest state of art in HVDC transmission.

✓ To understand method of conversion of AC to DC, performance of various level of pulse conversion

✓ To understand control characteristics of converters. It also provides knowledge of effect of source inductance as well as method of power control.

✓ To understand the requirements of reactive power control and filtering technique in HVDC system.

✓ To understand the harmonics in AC side of power line in a HVDC system and design of filters for various levels of pulse conversion.

Course Outcomes:

✓ To be able to acquire knowledge in transmission of HVDC power with regard to terminal equipments, type of HVDC connectivity and planning of HVDC system.

✓ To be able to develop knowledge with regard to choice of pulse conversion, control characteristic, firing angle control and effect of source impedance.

✓ To develop knowledge of reactive power requirements of conventional control, filters and reactive power compensation in AC side of HVDC system.

✓ Able to calculate voltage and current harmonics, and design of filters for six and twelve pulse conversion.
UNIT 1
Comparison of DC transmission and AC Transmission. Application of DC transmission, Description of DC transmission systems, planning for HVDC transmission, Modern trends in DC transmission.

UNIT 2
Static Power Conversion Basic conversion principle, pulse number, analysis of GRAETZ circuit with and without overlap, equivalent circuit, inverter equations, Power Factor and reactive power, 12 pulse converter unit.

UNIT 3
Basic philosophy, constant current Vs constant voltage, desired features of control, actual control characteristics, individual characteristics of rectifier and inverter, combined characteristics of rectifier and inverter, constant-minimum-ignition-angle control, constant current control, constant-extinction-angle control, individual phase -control, equidistant firing control, voltage dependent current order limit (VDCOL), basic philosophy of system control, direction of DC power flow, reversal of power flow, starting and stopping of DC link.

UNIT 4
DC system model for load flow studies. Load flow study of Ac Dc system sequential method, simultaneous method. Reactive power requirements in steady state, conventional control strategies, alternate control strategies equipment for reactive power.

UNIT 5
short circuit ratio, Effective short circuit ratio, dynamic over voltages, DC power modulation, commutation failure, disturbances on AC side, disturbances on DC side.

UNIT 6
Characteristic harmonics, derivation of relevant equations for 12 pulse converter. AC filters, single tuned, doubled tuned filters. Brief introduction to DC circuit breakers, multi terminal DC transmission.

TEXT BOOKS:

REFERENCE BOOKS:

WEB LINKS
1.www.nptel.ac.in/
2.elearning.vtu.ac.in/
UNIT-I: Reactive Power flow and voltage stability in power systems: Physical relationship indicating dependency of voltage on reactive power flow - reactive power, transient stability; Q-V curve; definition of voltage stability, voltage collapse and voltage security. Voltage collapse phenomenon, Factors of voltage collapse, effects of voltage collapse, voltage collapse analysis.

UNIT-II: voltage collapse and voltage security. Voltage collapse phenomenon, Factors of voltage collapse, effects of voltage collapse, voltage collapse analysis.

UNIT-III: Power system loads: Load characteristics that influence voltage stability such as - Discharge lighting, Induction motor, Air conditioning and heat pumps, Electronic power supplies, Over Head lines and cables.


UNIT-V: Voltage stability static indices: Development of voltage collapse index - power flow studies - singular value decomposition - minimum singular value of voltage collapse - condition number as voltage collapse index.

REFERENCES:

WEB LINKS
1. www.nptel.ac.in/  
2. elearning.vtu.ac.in/
IV B.TECH II SEM

INSTRUMENTATION (Elective - III)  L  T  P  C
                                      2  1  0  3

Course Objectives:
✓ To study various types of signals and their representation.
✓ To study various types of transducers: Electrical, Mechanical, Electromechanical, Optical etc.
✓ To study and measure the various types of Non-electrical quantities.
✓ To study various types of digital voltmeters To study the working principles of various types of oscilloscopes and their applications.
✓ To study various types of signal analyzers.

Course Outcomes:
✓ Able to represent various types of signals.
✓ Acquire proper knowledge to use various types of Transducers.
✓ Able to monitor and measure various parameters such as strain, velocity, temperature, pressure etc.
✓ Acquire proper knowledge and working principle of various types of digital voltmeters.
✓ Able to measure various parameter like phase and frequency of a signal with the help of CRO.
✓ Acquire proper knowledge and able to handle various types of signal analyzers.

and uncertainty analysis. Statistical analysis of data and curve fitting.


UNIT -4 : Signals, Systems and Communications: Periodic and aperiodic signals. Impulse response, transfer function and frequency response of first- and second order systems.


TEXT BOOKS
1. Industrial Instrumentation by K. Krishnaswamy (Author), S. Vijayachitra (Author)
2. Electronic Instrumentation by Kalsi H S Tata McGraw-Hill Education
3. Electronic Instruments and Instrumentation Technology by Anand M. M. S. (Author)
4. Basic Electronics and Instrumentation by Saifullah Khalid (Author), Neetu Agrawal (Author)
5. A Course in Electrical & Electronics Measurements and Instrumentation By AK Sawhney

REFERENCE BOOKS
1. Fundamentals Of Industrial Instrumentation by Alok Barua (Author)
2. Transducers and Instrumentation By DVS Murthy
3. Principles of Measurement and Instrumentation By A.S.Morris
4. Modern Electronic Instrumentation and Measurement Techniques By W.D.Cooper and A.D.Helfrick
5. Transducers and Instrumentation By D.V.S.Murthy

WEB LINKS:
1. elearning.vtu.ac.in/
2. nptel.ac.in/
Course Objectives:

- To understand the phenomena associated with transmission line, operating at extra high voltages.
- To enable the student to calculate the line resistance, inductance and capacitance.
- The objective is to discuss phenomena of corona, losses, audible noise, radio interference and measurement of these quantities.
- To understand the concept of reactive power compensation.

Course Outcomes:

- To be able to acquaint with transmission line, operating at extra high voltages.
- Further knowledge is gained in the line resistance, inductance and capacitance calculation.
- To develop ability for determining corona, radio interference, audible noise generation and frequency spectrum for single and three phase transmission lines.
- Able to understand the effect of reactive power compensation.


UNIT II: Calculation of line resistance and inductances: resistance of conductors, temperature rise of conductor and
current carrying capacity. Properties of bundled conductors and geometric mean radius of bundle, inductance of two conductor lines and multi – conductor lines, Maxwell’s coefficient matrix.

**UNIT III:** Line capacitance calculation: capacitance of two conductor line, and capacitance of multi conductor lines, potential coefficients for bundled conductor lines, sequence inductances and capacitances and diagonalization.

**UNIT IV:** Calculation of electro static field traveling waves due to corona – Audio noise die to corona, its generation, characteristics and limits measurement of audio noise. Surface voltage Gradient on conductors, surface gradient on 2 conductor bundle and cosine law, Maximum surface voltage gradient of bundle with more than 3 sub conductors, Mangolt formula.
Corona : Corona in EHV lines – corona loss formulate – attenuation of traveling waves due to corona – Audio noise due to corona, its generation, characteristics and limits measurement of audio noise.

**UNIT-V:** Power Frequency voltage control : Problems at power frequency, generalized constants, No load voltage conditions and charging currents, voltage control using synchronous conductor, cascade connection of components : Shunt and series compensation, sub synchronous resonance in series – capacitor compensated lines

**UNIT VI:** Static reactive compensation systems: Introduction, SVC schemes, Harmonics injected in to network by TCR, design of filters for suppressing harmonics injected in to the system.
REFERENCE BOOKS:


WEB LINKS

1. www.nptel.ac.in/
2. elearning.vtu.ac.in/
UNIT I: BASIC CONCEPTS OF MODELING:
Basic Two-pole Machine representation of Commutator machines, 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron’s primitive Machine voltage, current and Torque equations.

UNIT II: DC MACHINE MODELING:
Mathematical model of separately excited D.C motor – Steady State analysis-Transient State analysis-Sudden application of Inertia Load-Transfer function of Separately excited D.C Motor- Mathematical model of D.C Series motor, Shunt motor-Linearization Techniques for small perturbations

UNIT III MODELING OF THREE PHASE INDUCTION MACHINE – I:
Transformation from Three phase to two phase and Vice Versa – Transformation from Rotating axes to stationary axes and vice versa –Park’s Transformation and it’s physical concept –The Inductance matrix-Mathematical model of Induction machine –Steady State analysis.

UNIT IV MODELING OF THREE PHASE INDUCTION MACHINE – II:
induction machine-Per unit model – Dynamic simulation of induction machine.

UNIT V MODELING OF SINGLE PHASE INDUCTION MACHINE:
Comparison between single phase and poly-phase induction motor – Cross field theory of single-phase induction machine, steady state analysis – steady state torque

UNIT VI MODELING OF SYNCHRONOUS MACHINE:
Synchronous machine inductances – The phase Co-ordinate model-The Space phasor (d-q) model-Steady state operation- Mathematical model of PM Synchronous motor.

REFERENCE BOOKS:

WEB LINKS:
1. www.nptel.ac.in/
2. elearning.vtu.ac.in/
DISTRIBUTION OF ELECTRIC POWER  
(Elective-IV)  
L T P C   
2 1 0 3  
Course Objectives:  
✓ To study different factors of Distribution system.  
✓ To study and design the substations and distribution systems.  
✓ To study the determination of voltage drop and power loss.  
✓ To study the distribution system protection and its coordination.  
✓ To study the effect of compensation on p.f improvement.  
✓ To study the effect of voltage control on distribution system.  
Course Outcomes:  
✓ Able to understand the various factors of distribution system.  
✓ Able to design the substation and feeders.  
✓ Able to determine the voltage drop and power loss.  
✓ Able to understand the protection and its coordination.  
✓ Able to understand the effect of compensation on p.f improvement.  
✓ Able to understand the effect of voltage, current distribution system performance.  
UNIT – I DISTRIBUTION SYSTEMS ANALYSIS  
Distribution systems: Classification of distribution systems- comparison of DC Vs AC- AC single phase and three phase three wire and four wire systems – Kelvin’s law – most economical size of conductor –
An overview of the role of computers in distribution system planning – Load modeling and characteristics: definition of basic terms like demand factor, utilization factor, load factor, plant factor, diversity factor, coincidence factor, contribution factor, and loss factor- Relationship between the load factor and loss factor - Classification of loads. (Residential, Commercial Agricultural and Industrial) and their characteristics.

**Unit II Distribution Feeders and Substations:** Design consideration of Distribution feeders: Radial and loop types of primary feeders, voltage levels, feeder loading. Design practice of the secondary distribution system, Location of Substations, Rating of a Distribution Substation, service area within primary feeders, Benefits derived through optimal location of substations.

**Unit III Voltage drop and power loss calculations:** Derivation for voltage drop and power loss in lines, manual methods of solution for radial and ring networks, three-phase balanced primary lines.


**Unit V Capacitive compensation for power factor 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 and constant KVA type loads- Numerical Problems.
Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), power factor correction, capacitor location - Economic justification Procedure to determine the best capacitor location.

**Unit VI Voltage control:** Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

**TEXT BOOKS:**


**WEB LINKS:**

IV B.TECH II SEM

SPECIAL MACHINES
(Elective – IV)

L  T  P  C
2  1  0  3

Course Objectives:
✓ To explain theory of operation and control of switched reluctance motor.
✓ To explain the performance and control of stepper motors, and their applications.
✓ To describe the operation and characteristics of permanent magnet dc motor.
✓ To distinguish between brush dc motor and brush less dc motor.
✓ To explain the theory of travelling magnetic field and applications of linear motors.
✓ To understand the significance of electrical motors for traction drives.

Course Outcomes:
✓ Explain theory of operation and control of switched reluctance motor.
✓ Explain the performance and control of stepper motors, and their applications.
✓ Describe the operation and characteristics of permanent magnet dc motor.
✓ Distinguish between brush dc motor and brush less dc motor.
✓ Explain the theory of travelling magnetic field and applications of linear motors.
✓ Understand the significance of electrical motors for traction drives.
UNIT- I STEPPER MOTOR:
Introduction, Types, Hybrid stepper motor- construction, principle of operation, two phases energized at a time, conditions for operation, different configurations, VR Stepper motor- single stack and multi stack, Drive systems and circuit for open loop and Closed loop control of stepping motor. Dynamic characteristics. Single phase stepper Motor, Expression of voltage, current and torque for stepper motor and criteria for synchronization.

UNIT-II SWITCHED RELUCTANCE MOTOR:
Constructional features, principle of operation, Design Aspects and profile of the SRM, Torque equation, Power converters and rotor sensing mechanism, expression of torque and torque-speed characteristics.

UNIT-III PERMANENT MAGNET AND BRUSHLESS D.C MOTORS
Minor hysteresis loops and recoil line, stator frames of Conventional PM dc Motors, Equivalent circuit of a PM, Brushless D.C motor-principle of operation, Types of construction, d-q analysis of BLDC motor.

UNIT-IV LINEAR INDUCTION MOTOR
Types of linear motors, construction details-Flat LIMs, Tubular LIMs, LIM equivalent circuit, Design considerations, Realistic Considerations, selection and applications of LIM.

UNIT-V LINEAR SYNCHRONOUS MOTORS
Principle of operation-type of LSM-iron core LSM-permanent magnet LSM-air core LSM-linear homo polar synchronous motor-LSM control.
UNIT-VI SERVO MOTORS

TEXT BOOKS

REFERENCE BOOKS
2. Sensorless Vector Direct Torque control –Peter Vas, Oxford University Press

WEB LINKS
1. www.nptel.ac.in/
2. elearning.vtu.ac.in/
UNIT I INTRODUCTION
Conventional design procedures – Limitations – Need for field analysis based design – Review of Basic principles of energy conversion – Development of Torque/Force.

UNIT-II MATHEMATICAL PROGRAMMING METHODS
Mathematical programming methods, computer aided design- Mathematical formulation of the problem. Programming techniques (LP & NLP only), Methods of solution, Unconstrained optimization problems, constrained optimization problem

UNIT III MATHEMATICAL FORMULATION OF FIELD PROBLEMS

UNIT IV PHILOSOPHY OF FEM
UNIT V CAD PACKAGES
Elements of a CAD System - Pre-processing - Modelling - Meshing - Material properties - Boundary Conditions - Setting up solution - Post processing.

UNIT VI DESIGN APPLICATIONS

TEXT BOOKS

REFERENCES
Course Objectives:

- To learn different types of power quality phenomena.
- To identify sources for voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
- To describe power quality terms and study power quality standards.
- To learn the principle of voltage regulation and power factor improvement methods.
- To explain the relationship between distributed generation and power quality.
- To understand the power quality monitoring concepts and the usage of measuring instruments.

Course outcomes:

- Differentiate between different types of power quality problems.
- Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
- Analyze power quality terms and power quality standards. Explain the principle of voltage regulation and power factor improvement methods.
- Demonstrate the relationship between distributed generation and power quality.
- Explain the power quality monitoring concepts and the usage of measuring instruments.
UNIT-I:  
Introduction  

UNIT-II:  
Voltage imperfections in power systems  

UNIT-III  
Voltage Regulation and power factor improvement:  
Principles of regulating the voltage – Device for voltage regulation – Utility voltage regulator application – Capacitor for voltage regulation – End-user capacitor application – Regulating utility voltage with distributed resources – Flicker – Power factor penalty – Static VAR compensations for power factor improvement.

UNIT- IV  
Harmonic distortion and solutions  
Voltage distortion vs. Current distortion – Harmonics vs. Transients – Harmonic indices – Sources of harmonics – Effect of harmonic distortion – Impact of capacitors, transformers, motors and meters – Point of common

UNIT-V
Distributed Generation and Power Quality

UNIT-VI
Monitoring and Instrumentation

TEXTBOOKS:

REFERENCE BOOKS:

WEB LINKS:
1. www.nptel.ac.in/
2. elearning.vtu.ac.in/