JAWAHARLAL NEHRU
TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR – 515 002 (A.P) INDIA

ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABI

ELECTRICAL AND ELECTRONICS
ENGINEERING

B.Tech. Regular Four Year Degree Course
(Applicable for the batches admitted from 2009-2010)
&
B.Tech. (LES) (for the batches admitted from 2010–11)
Academic Regulations 2009 for B. Tech (Regular)
(Effective for the students admitted into I year from the Academic Year 2009-2010 onwards)

1. Award of B.Tech. Degree
   A student will be declared eligible for the award of the B.Tech. Degree if he fulfils the following academic regulations:
   i. Pursue a course of study for not less than four academic years and in not more than eight academic years.
   ii. Register for 220 credits and secure all 220 credits

2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech course and their admission is cancelled.

3. Courses of study
   The courses of study are offered at present for specialization for the B. Tech. Course:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Branch</th>
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<tbody>
<tr>
<td>1</td>
<td>Aeronautical Engineering.</td>
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<tr>
<td>2</td>
<td>Biotechnology.</td>
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<tr>
<td>3</td>
<td>Civil Engineering.</td>
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<tr>
<td>4</td>
<td>Computer Science and Engineering.</td>
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<td>5</td>
<td>Computer Science and System Engineering.</td>
</tr>
<tr>
<td>6</td>
<td>Electrical and Electronics Engineering.</td>
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<tr>
<td>7</td>
<td>Electronics and Communication Engineering.</td>
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<tr>
<td>8</td>
<td>Electronics and Computer Engineering.</td>
</tr>
<tr>
<td>9</td>
<td>Electronics and Control Engineering.</td>
</tr>
<tr>
<td>10</td>
<td>Electronics and Instrumentation Engineering.</td>
</tr>
<tr>
<td>11</td>
<td>Information Technology.</td>
</tr>
<tr>
<td>12</td>
<td>Mechanical Engineering.</td>
</tr>
</tbody>
</table>

   and any other course as approved by the authorities of the University from time to time.
4. Credits

<table>
<thead>
<tr>
<th></th>
<th>I Year</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Periods / Week</td>
<td>Credits</td>
</tr>
<tr>
<td>Theory</td>
<td>03</td>
<td>06</td>
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<td></td>
<td>02</td>
<td>04</td>
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<tr>
<td>Practical</td>
<td>03</td>
<td>04</td>
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<tr>
<td>Drawing</td>
<td>06</td>
<td>06</td>
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<td></td>
<td></td>
<td>06</td>
</tr>
<tr>
<td>Seminar</td>
<td>--</td>
<td>--</td>
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<tr>
<td>Project</td>
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</tr>
</tbody>
</table>

5. Distribution and Weightage of Marks

i. The performance of a student in each semester / I year shall be evaluated subject-wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition seminar and project work shall be evaluated for 50 and 200 marks respectively.

ii. For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

iii. For theory subjects, during the semester there shall be Two midterm examinations. Each mid term examination consists of objective paper for 10 marks and subjective paper for 20 marks with duration of 1 hour 50 minutes (20 minutes for objective and 90 minutes for subjective paper).

   Objective paper is set for 20 bits for 10 marks. Subjective paper shall contain 5 questions of which student has to answer 3 questions evaluated* for 20 marks. First mid term examination shall be conducted for I-IV units of syllabus and second mid term examination shall be conducted for V-VIII units. The total marks secured by the student in each mid term examination for 30 marks is considered and the better of the two mid term examinations shall be taken as the final sessional marks secured by each candidate in the subject.

   However for first year, there shall be Three midterm examinations as in the above pattern and the average marks of the best two midterm examinations secured in each subject shall be considered as final marks for sessionals.
*Note 1: The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks, any fraction rounded off to the next higher mark

*Note 2: The mid term examination shall be conducted first by distribution of the Objective paper simultaneously marking the attendance, after 20 minutes the answered objective paper is collected back. The student is not allowed to leave the examination hall. Then the descriptive question paper and the answer booklet are distributed. After 90 minutes the answered booklets are collected back.

iv. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Day-to-day work in the laboratory shall be evaluated for 25 marks by the concerned laboratory teacher based on the report of experiments/jobs. The end examination shall be conducted by the laboratory teacher and another examiner.

v. For the subject having design and/or drawing, such as Engineering Drawing, Machine Drawing and estimation, the distribution shall be 30 marks for internal evaluation and 70 marks for end examination. The Internal evaluation for sessionals will be 15 marks for day-to-day work in the class that shall be evaluated by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm exams in a Semester for a duration of 2hrs each, evenly distributed over the syllabi for 15 marks and the better of the two shall be considered as internal test marks. The sum of day to day evaluation and the internal test marks will be the final sessionals for the subject. However in the I year class, there shall be three midterm exams and the average of best two will be taken into consideration.

vi. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department before presentation. The report and the presentation shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The
seminar shall be evaluated for 50 marks and marks shall be submitted to the University along with internal marks. There shall be no external examination for seminar.

vii. Out of a total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination (Viva-voce). The viva-voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the University. The evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be made by the departmental committee, on the basis of two seminars given by each student on the topic of his project.

viii. Laboratory marks and the sessional marks awarded by the College are not final. They are subject to scrutiny and scaling by the University wherever necessary. In such cases, the sessional and laboratory marks awarded by the College will be referred to a Committee. The Committee will arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding.

ix. The laboratory records and internal test papers shall be preserved in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

6. Attendance Requirements:

i. A student shall be eligible to appear for University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester/ I year.

ii. Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

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

iv. Students whose shortage of attendance is not condoned in any semester / I year are not eligible to take their end examination of that class and their registration shall stand cancelled.

v. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester / I
year, as applicable. They may seek readmission for that semester / I year when offered next.

vi. A stipulated fee shall be payable towards condonation of shortage of attendance to the University.

7. **Minimum Academic Requirements:**
The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. In the Seminar he should secure 40%.

ii. A student shall be promoted from II to III year only if he fulfils the academic requirement of securing **40** credits from

   a. One regular and one supplementary examinations of I year.
   b. One regular examination of II year I semester
      irrespective of whether the candidate takes the end examination or not as per the normal course of study.

iii. A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of securing **68** credits from the following examinations,

   a. Two regular and two supplementary examinations of I year.
   b. Two regular and one supplementary examinations of II year I semester.
   c. One regular and one supplementary examinations of II year II semester.
   d. One regular examination of III year I semester.
      irrespective of whether the candidate takes the end examination or not as per the normal course of study.

And in case of getting detained for want of credits by sections ii and iii above, the student may make up the credits through supplementary exams of the above exams before the date of class work commencement of Third or Fourth year I semester respectively.
iv. A student shall register and put up minimum attendance in all 220 credits and earn all the 220 credits. Marks obtained in all 220 credits shall be considered for the calculation of percentage of marks obtained.

v. Students who fail to earn 220 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

8. Course pattern:
   i. The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years on semester pattern.
   ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.
   iii. When a student is detained due to lack of credits / shortage of attendance he may be re-admitted when the semester is offered after fulfilment of academic regulations, whereas he continues to be in the academic regulations he was first admitted.

9. Transitory Regulations:
   Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2 and they continues to be in the academic regulations they were first admitted.

10. With–holding of results:
    If the candidate has any dues not paid to the university or if any case of indiscipline or malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.
11. **Award of Class:**
   After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes:

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of marks to be secured</th>
<th>From the aggregate marks secured for the best 220 Credits.</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>70% and above</td>
<td></td>
</tr>
<tr>
<td>First Class</td>
<td>Below 70% but not less than 60%</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>Below 50% but not less than 40%</td>
<td></td>
</tr>
</tbody>
</table>

   (The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

12. **Minimum Instruction Days:**
   The minimum instruction days including exams for each semester / I year shall be 90/180 days respectively.

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

14. There shall be no place transfer within the Constituent Colleges.

15. **General:**
   i. The academic regulations should be read as a whole for purpose of any interpretation.
   ii. Malpractices rules- nature and punishments is appended
   iii. Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
   iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
   v. The University may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on roles with effect from the dates notified by the University.

*_**_*
ACADEMIC REGULATIONS FOR B. TECH.
(LATERAL ENTRY SCHEME)
(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2010-2011 and onwards)

1. Award of B.Tech. Degree
A student admitted in LES will be declared eligible for the award of the B. Tech Degree if he fulfils the following academic regulations:

i. Pursue a course of study for not less than three academic years and in not more than six academic years.

ii. Register for 168 credits and secure all 168 credits from II to IV year of Regular B.Tech. program

2. Students, who fail to fulfil the requirement for the award of the degree in six consecutive academic years from the year of admission, shall forfeit their seat.

3. The regulations 3 to 6 are to be adopted as that of B. Tech. (Regular).

7. Minimum Academic Requirements:
The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. For the Seminar he should secure 40% in the internal evaluation.

ii. A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of 42 credits from the following examinations.

a. Two regular and one supplementary examinations of II year I semester.
b. One regular and one supplementary examinations of II year II semester.
c. One regular examination of III year I semester.

irrespective of whether the candidate takes the end examination or not as per the normal course of study.

and in case of getting detained for want of credits the student may make up the credits through supplementary exams of the above
exams before the date of class work commencement of Fourth year I semester.

8. Course Pattern
i. The entire course of study is three academic years on semester pattern.
ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.
iii. When a student is detained due to lack of credits / shortage of attendance he may be re-admitted when the semester is offered after fulfilment of academic regulations, whereas he continues to be in the academic regulations he was first admitted.

9. The regulations 9 to 10 are to be adopted as that of B. Tech. (Regular).

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

<table>
<thead>
<tr>
<th>First Class with Distinction</th>
<th>70% and above</th>
<th>From the aggregate marks secured for 168 Credits. (i.e. II year to IV year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class</td>
<td>Below 70% but not less than 60%</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>Below 50% but not less than 40%</td>
<td></td>
</tr>
</tbody>
</table>

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

12. The regulations 12 to 15 are to be adopted as that of B. Tech. (Regular). All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)
RULES FOR
DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

<table>
<thead>
<tr>
<th>Nature of Malpractices/Improper conduct</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>If the candidate:</strong></td>
<td></td>
</tr>
<tr>
<td>1. (a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td>(b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.</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>
</tbody>
</table>
| 2. Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which he is appearing | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including.
<p>| | | |</p>
<table>
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<tr>
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<tbody>
<tr>
<td>practical) in which the candidate is appearing.</td>
<td>practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.</td>
<td></td>
</tr>
<tr>
<td>3. Impersonates any other candidate in connection with the examination.</td>
<td>The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.</td>
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</tr>
<tr>
<td>4. Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question</td>
<td>Expulsion from the examination hall and cancellation of performance in</td>
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<tr>
<td>2009-10</td>
<td>paper during the examination or answer book or additional sheet, during or after the examination.</td>
<td>that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University 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>5.</td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
<td>Cancellation of the performance in that subject.</td>
</tr>
<tr>
<td>6.</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 walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation,</td>
<td>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police</td>
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<tr>
<td>assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</td>
<td>and a police case is registered against them.</td>
<td></td>
</tr>
<tr>
<td>7. Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
<td></td>
</tr>
<tr>
<td>8. Possess any lethal weapon or firearm in the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of the</td>
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<td>9.</td>
<td>If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</td>
<td>Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.</td>
</tr>
<tr>
<td>10.</td>
<td>Comes in a drunken condition to 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</td>
</tr>
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<tr>
<td>11.</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</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>
</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 University for further action to award suitable punishment.</td>
<td>Malpractices identified by squad or special invigilators 1. Punishments to the candidates as per the above guidelines. 2. Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices) (i) A show cause notice shall be issued to the college. (ii) Impose a suitable fine on the college. Shifting the examination centre from the college to another college for a specific period of not less than one year.</td>
</tr>
</tbody>
</table>

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Course structure for B.Tech. (Regular) I year (2009-10) for affiliated Engineering Colleges.

**ELECTRICAL AND ELECTRONICS ENGINEERING (E.E.E.)**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Course code</th>
<th>Subject</th>
<th>Th</th>
<th>Tu/Drg/Lab</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>9ABS101</td>
<td>English</td>
<td>2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>9ABS102</td>
<td>Engineering Physics</td>
<td>2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>9ABS103</td>
<td>Engineering Chemistry</td>
<td>2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>9ABS104</td>
<td>Mathematics – I</td>
<td>3</td>
<td>1 - -</td>
<td>6</td>
</tr>
<tr>
<td>5.</td>
<td>9A05101</td>
<td>Programming in C and Data Structures</td>
<td>3</td>
<td>1 - -</td>
<td>6</td>
</tr>
<tr>
<td>6.</td>
<td>9A03101</td>
<td>Engineering Drawing *</td>
<td>-</td>
<td>6 -</td>
<td>6</td>
</tr>
<tr>
<td>7.</td>
<td>9ABS105</td>
<td>Mathematical Methods</td>
<td>3</td>
<td>1 - -</td>
<td>6</td>
</tr>
<tr>
<td>8.</td>
<td>9A05102</td>
<td>C Programming &amp; Data Structures Lab</td>
<td>-</td>
<td>- 3</td>
<td>4</td>
</tr>
<tr>
<td>9.</td>
<td>9A03102</td>
<td>Engineering &amp; I.T. Workshop #</td>
<td>-</td>
<td>- 3</td>
<td>4</td>
</tr>
<tr>
<td>10.</td>
<td>9ABS106</td>
<td>Engineering Physics and Engineering Chemistry Lab **</td>
<td>-</td>
<td>- 3</td>
<td>4</td>
</tr>
<tr>
<td>11.</td>
<td>9ABS107</td>
<td>English Language &amp; Communication Skills Lab</td>
<td>-</td>
<td>- 3</td>
<td>4</td>
</tr>
</tbody>
</table>

contact periods/week

| Total /week | 36 |

Total Credits (7 Theory + 4 Labs) 52

Th = Theory; Tu = Tutorial; Drg = Drawing & Lab = Laboratory:
* Engineering Drawing will have University External Exam.
** The Students attend the Physics lab and Chemistry lab in alternate weeks. The end exam shall be conducted separately and average of the two exams will be recorded by the University exam section.

# Students attend Engineering and IT work shop as a single lab every week and the end exam is conducted as a single lab. Sharing the Maximum marks and time for one task each from Engineering workshop and IT workshop. The sum of the marks awarded will be recorded.

** JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR

ELECTRICAL AND ELECTRONICS ENGINEERING (E.E.E.)

II Year B.Tech - I Semester

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Course code</th>
<th>Subject</th>
<th>Theory</th>
<th>Lab.</th>
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<td>Electronic Devices and circuits</td>
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<td>Electrical Circuits</td>
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**contact periods/week**

| Total/Week | 30 |

Total Credits (6 Theory + 2 Labs) 28
II Year B.Tech - II Semester

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Total Credits (6 Theory + 2 Labs) 28
### III Year B.Tech I-Sem

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**Total Credits (6 Theory + 2 Labs)**: 28
III Year B.Tech II-Sem

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## IV Year B.Tech I-Sem

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## IV Year B.Tech II-Sem

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<td>9A02805</td>
<td>2. Special Electrical Machines</td>
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<td>3. Plc &amp; Dcs - Its Applications</td>
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<td>9A02808</td>
<td>2. Design of Electrical Systems</td>
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1. Introduction:

The sweeping changes in the world have elevated English to the status of a tool of global communication and transformed it into e-English. The syllabus has been drafted to improve the competence of students in communication in general and language skills in particular. The books prescribed serve as students’ handbooks.

The teacher should focus on the skills of reading, writing, listening and speaking while using the prescribed text and exercises. The classes should be interactive. The students should be encouraged to participate in the classroom proceedings and also to write short paragraphs and essays. The main aim is to encourage two way communications in place of the one-sided lecture.

The text for non-detailed study is meant for extensive reading by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements etc.

2. Objectives:

a. To improve the language proficiency of the students in English with an emphasis on LSRW skills.

b. To equip the students to study academic subjects with greater facility through theoretical and practical components of the syllabus.

c. To develop study skills as well as communication skills in formal and informal situations.
3. SYLLABUS:

Listening Skills:
Objectives
1. To enable students to develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and dialects.

*Students should be given practice in listening and identifying the sounds of English language and to mark stress, right intonation in connected speech.*

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:
Objectives
1. To make students aware of the role of ability to speak fluent English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.

- Oral practice
- Describing objects/situations/people
- Role play—Individual/Group activities
- Just A Minute (JAM) Sessions.

(Using exercises from all units of the prescribed text)

Reading Skills:
Objectives
1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop the ability to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

- Skimming the text
- Understanding the gist of an argument
- Identifying the topic sentence
• Inferring lexical and contextual meaning
• Understanding discourse features
• Recognizing coherence/sequencing of sentences

The students shall be trained in reading skills using the prescribed text for detailed study. They shall be examined in reading and answering questions using ‘unseen’ passages which may be taken from the non-detailed text or other authentic texts, such as articles from magazines/newspapers.

Writing Skills:
Objectives
1. To develop an awareness in the students the skill to write exact and formal writing
2. To equip them with the components of different forms of writing.
   • Writing sentences
   • Use of appropriate vocabulary
   • Paragraph writing
   • Coherence and cohesiveness
   • Narration / description
   • Note Making
   • Formal and informal letter writing
   • Editing a passage

4. TEXTBOOKS PRESCRIBED:
In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content are prescribed and divided into Eight Units:

For Detailed study: ENJOYING EVERYDAY ENGLISH,
Sangam Books (India) Pvt Ltd, Hyderabad, 2009
For Non-detailed study: INSPIRING LIVES,
Maruti Publications, Guntur, 2009

UNIT -I
a. Heaven’s Gate from ENJOYING EVERYDAY ENGLISH
b. Mokshagundam Visvesaraya from INSPIRING LIVES
UNIT -II
   a. Sir C.V. Raman from **ENJOYING EVERYDAY ENGLISH**
   b. Mother Teresa from **INSPIRING LIVES**

UNIT -III
   a. The Connoisseur from **ENJOYING EVERYDAY ENGLISH**
   b. Dr. Amartya Kumar Sen from **INSPIRING LIVES**

UNIT -IV
   a. The Cuddalore Experience from **ENJOYING EVERYDAY ENGLISH**
   b. Gertrude Elion from **INSPIRING LIVES**

UNIT -V
   a. Bubbling Well Road from **ENJOYING EVERYDAY ENGLISH**
   b. Vishwanathan Anand from **INSPIRING LIVES**

UNIT -VI
   a. Odds Against Us from **ENJOYING EVERYDAY ENGLISH**
   b. Charlie Chaplin from **INSPIRING LIVES**

UNIT – VII
   Exercises on
   Reading and Writing Skills
   Reading Comprehension
   Letter writing
   Report writing

UNIT – VIII
   Exercises on
   Remedial Grammar covering Common errors in English, Subject-Verb agreement,
   Use of Articles and Prepositions, Active/Passive Voice, Reported speech, Tenses
   Vocabulary development covering Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.
Evaluation: The question paper shall contain two parts, Part A containing questions from Units I- VI and Part B containing questions from units VII & VIII. The student is required to answer five full questions choosing at least one from Part B.

REFERENCES:
1. Technical Communication, Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009
(9ABS102) ENGINEERING PHYSICS


UNIT III- PRINCIPLES OF QUANTUM MECHANICS & ELECTRON THEORY: Waves and Particles - de-Broglie’s hypothesis – Heisenberg’s uncertainty principle - Schroedinger’s one dimensional wave equation (Time Independent) - Particle in a one dimensional potential box – Energy levels - Fermi-Dirac distribution and effect of Temperature (qualitative treatment only) – Scattering - Source of electrical resistance - Kronig-Penney model (qualitative treatment only) - energy bands – metals, semi conductors & insulators.


DIELECTRIC PROPERTIES: Introduction - Dielectric constant - Electronic, Ionic and Orientation polarizations (qualitative treatment only) - Local field - Clausius-Mossotti equation –Frequency dependence of polarisability (qualitative treatment only) – Ferro electricity- BaTio₃.

UNIT VI- SUPERCONDUCTIVITY: General properties - Meissner effect - Penetration depth - Type I and Type II superconductors - Flux quantization – Josephson effects – BCS theory - Applications of superconductors.


TEXT BOOKS:
1. Engineering Physics by P.K.Palanisamy, Scitech Publications
REFERENCES:
1. Physics Volume 2, by Halliday, Resnick and Krane; John Wiley India
2. Solid State Physics by C.Kittel, Wiley India
3. Engineering Physics by Mittal, I.K.International


UNIT IV: Chemistry of nano materials: Nano materials definition, properties and applications;
Explosives and Propellants: Explosives, Classification, precautions during storage, blasting fuses, important explosives. Rocket propellants, classification of propellants.
Lubricants: Principles and function of lubricants - Classification and properties of lubricants – Viscosity, flash and fire points, cloud and pour points, aniline point, Neutralisation Number and Mechanical Strength.

Electrochemical Cells: Measurement of EMF, Standard electrode potential, concentration cells, batteries (Ni–Cd cell), Lithium batteries.
Fuel cell: hydrogen oxygen fuel cell and methanol fuel cell
Insulators – Definition, Properties and Characteristics of Insulating Materials; Engineering Applications.

UNIT VI: Phase rule: Definition, Terms involved in Phase Rule and Phase rule equation. Phase diagrams – one component system (water system), two component system (lead- silver system) Eutectics, heat treatment based on iron-carbon phase diagram, hardening, annealing.

Metallurgical Coke – Characteristics & Manufacture (Otto-Halfmann).
Combustion: Flue gas analysis by Orsat’s apparatus.

Refractories : Definition, Classification With Examples; Criteria of a Good Refractory Material; Causes for the failure of a Refractory Material
TEXT BOOKS:
1. Engineering Chemistry  Prof. K.N.Jayaveera, Dr.G.V.Subba Reddy and Dr.C. Ramachandraiah, McGraw Hill Higher Education Hyd., 2009

REFERENCE:
2. Fuel Cells principles and applications by B.Viswanath, M.Aulice Scibioh-Universities press
4. Physical Chemistry - Glasston & Lewis.
UNIT I– Differential equations of first order and first degree – Exact, linear and Bernoulli equations. Applications: to Newton’s law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT II– Non-homogeneous linear differential equations of second and 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), method of variation of parameters.

UNIT III– Rolle’s Theorem – Lagrange’s Mean Value Theorem – (excluding proof). Simple examples of Taylor’s and Maclaurin’s Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

UNIT IV
Raidus of Curvature – Curve tracing – Cartesian, polar and parametric curves. Applications of integration to lengths, volume and surface area of solids of revolution in Cartesian and polar coordinates

UNIT V– Multiple integral: – Double and triple integrals – Change of Variables – Change of order of integration.

UNIT VII– Differentiation and integration of Laplace transform – Application of Laplace transforms to ordinary differential equations of first and second order.


TEXT BOOKS:

REFERENCES:

UNIT II- Introduction to C Language - C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Expressions, Precedence and Associativity, Expression Evaluation, Operators and Expressions, Type Conversions, Decision Statements - If and Switch Statements, Loop Control Statements - while, for, do-while Statements, Nested for Loops, Other Related Statements - break, continue, goto.


UNIT V- Structure and Union – Introduction, Features of Structures, Declaration and Initialization of Structures, Structure within Structure, Array of Structures, Pointer to Structure, Structure and Functions, typedef, Bit Fields, Enumerated Data Type, Union, Union of Structures.

UNIT VI- Files - Introduction, Streams and File Types, Steps for File Operations, File I/O Structures, Read and Write, Other File function, Searching Errors in Reading/Writing of Files, Low Level Disk I/O, Command Line Arguments, Application of Command Line Arguments, File Status functions (error handling).

Linked List - Singly Linked List, Linked List with and without header, Insertion, Deletion and Searching Operations.


TEXT BOOKS :
1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education

REFERENCES :
3. C and Data Structures, a snapshot oriented treatise with live engineering examples, Dr. N.B. Venkateswarlu, Dr. E.V. Prasad, S. Chand
UNIT I – INTRODUCTION TO ENGINEERING DRAWING:
Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions. Curves used in Engineering Practice:
a) Conic Sections including the Rectangular Hyperbola – General method only.
b) Cycloid, Epicycloids and Hypocycloid
c) Involute.
d) Helices

UNIT II – PROJECTION OF POINTS AND LINES: Principles of Orthographic Projection – Conventions – First and Third Angle Projections. Projections of Points, Lines inclined to one or both planes, Problems on projections, Finding True lengths & traces only.

UNIT III – PROJECTIONS OF PLANES: Projections of regular Plane surfaces/figures, Projection of lines and planes using auxiliary planes.

UNIT IV – PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to one or both planes – Auxiliary Views.


Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their Sectional parts.

UNIT VI – ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS: Principles of Isometric Projection – Isometric Scale – Isometric Views–

Conversion of Isometric projections/views to Orthographic Views – Conventions.

**UNIT VII– INTERPENETRATION OF RIGHT REGULAR SOLIDS:** Projections of curves of Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Square Prism Vs Square Prism.

**UNIT VIII– PERSPECTIVE PROJECTIONS:** Perspective View of Plane Figures and Simple Solids. Vanishing Point Method (General Methods only).

**TEXT BOOKS:**
1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, Johle, Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education

**REFERENCES:**
1. Engineering Drawing and Graphics, Venugopal/ New age
2. Engineering Drawing, B.V.R. Guptha, J.K. Publishers
UNIT – I


UNIT – II
Real matrices – Symmetric, skew – Symmetric, orthogonal matrices

UNIT – III

UNIT – IV

UNIT – V

UNIT – VI

UNIT – VII
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace’s equation under initial and boundary conditions.

UNIT – VIII
TEXT BOOKS:

REFERENCES:
3. Introduction to Numerical Analysis – S.S. Sastry Ph - I
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 data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:
- Intel based desktop PC with ANSI C Compiler and Supporting Editors

Week 1.
**a)** Write a C program to find the sum of individual digits of a positive integer.
**b)** A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
**c)** Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Week 2.
**a)** Write a C program to calculate the following Sum:
\[
\text{Sum}=1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} - \frac{x^{10}}{10!}
\]
**b)** Write a C program to find the roots of a quadratic equation.

Week 3
**a)** Write C programs that use both recursive and non-recursive functions.
i) To find the factorial of a given integer.
ii) To find the GCD (greatest common divisor) of two given integers.

iii) To solve Towers of Hanoi problem.

**Week 4**

a) The total distance travelled by vehicle in ‘t’ seconds is given by distance \( S = ut + \frac{1}{2}at^2 \) where ‘u’ and ‘a’ are the initial velocity (m/sec.) and acceleration (m/sec\(^2\)) respectively. Write C program to find the distance travelled at regular intervals of time given the values of ‘u’ and ‘a’. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of ‘u’ and ‘a’.

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

**Week 5**

a) Write a C program to find both the largest and smallest number in a list of integers.

b) Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices
   ii) Multiplication of Two Matrices

**Week 6**

a) Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string in to a given main string from a given position.
   ii) To delete n Characters from a given position in a given string.

b) Write a C program to determine if the given string is a palindrome or not

**Week 7**

a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn’t contain T.

b) Write a C program to count the lines, words and characters in a given text.

**Week 8**

a) Write a C program to generate Pascal’s triangle.

b) Write a C program to construct a pyramid of numbers.
Week 9
Write a C program to read in two numbers, x and n, and then compute the sum of the geometric progression:
\[ 1 + x + x^2 + x^3 + \ldots + x^n \]
For example: if n is 3 and x is 5, then the program computes
\[ 1 + 5 + 25 + 125. \]
Print x, n, the sum
Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Find if any values of x are also illegal? If so, test for them too.

Week 10
a) 2’s complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2’s complement of 11100 is 00100. Write a C program to find the 2’s complement of a binary number.
b) Write a C program to convert a Roman numeral to its decimal equivalent.

Week 11
Write a C program that uses functions to perform the following operations:
i) Reading a complex number
ii) Writing a complex number
iii) Addition of two complex numbers
iv) Multiplication of two complex numbers
(Note: represent complex number using a structure.)

Week 12
a) Write a C program which copies one file to another.
b) Write a C program to reverse the first n characters in a file.
(Note: The file name and n are specified on the command line.)

Week 13
a) Write a C programme to display the contents of a file.
b) Write a C programme to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

Week 14
Write a C program that uses functions to perform the following operations on singly linked list:
   i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

Week 15
Write C programs that implement stack (its operations) using
   i) Arrays   ii) Pointers

Week 16
Write C programs that implement Queue (its operations) using
   i) Arrays   ii) Pointers

Week 17
Write a C program that uses Stack operations to perform the following:
   i) Converting infix expression into postfix expression
   ii) Evaluating the postfix expression

Week 18
Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Bubble sort   ii) Selection sort

Week 19
Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
   i) Linear search   ii) Binary search

Week 20
Write C program that implements the Quick sort method to sort a given list of integers in ascending order.
Week 21
Write C program that implement the Merge sort method to sort a given list of integers in ascending order.

Week 22
Write C programs to implement the Lagrange interpolation and Newton- Gregory forward interpolation.

Week 23
Write C programs to implement the linear regression and polynomial regression algorithms.

Week 24
Write C programs to implement Trapezoidal and Simpson methods.

REFERENCE BOOKS
1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education
ENGINEERING WORKSHOP

Objectives: The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

1. TRADES FOR EXERCISES:
   a. Carpentry shop— Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock
   b. Fitting shop— Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock
   c. Sheet metal shop— Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 guage G.I. sheet
   d. House-wiring— Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
   e. Foundry— Preparation of two moulds (exercises): for a single pattern and a double pattern.
   f. Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint
2. TRADES FOR DEMONSTRATION:
   a. Plumbing
   b. Machine Shop
   c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

REFERENCE BOOKS:

I.T. WORKSHOP

Objectives:
The IT Workshop for engineers is a training lab course. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher. **PC Hardware** introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. The students should work on a working PC (PIV or higher) to disassemble and assemble back to working condition and install
Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace for usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

Productivity tools module would enable the students in crafting professional word documents, excel spreadsheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX. (It is recommended to use Microsoft office 2007 in place of MS Office 2003)

PC Hardware
Week 1 – Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Week 2 – Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video shall be given as part of the course content.

Week 3 – Task 3: Every student should individually install MS Windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Week 4 – Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Week 5 – Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the
computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

**Week 6 – Task 6: Software Troubleshooting:** Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

**OFFICE TOOLS**

**LaTeX and Word**

**Week 7 – Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

**Task 1 : Using LaTeX and Word** to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**Excel**

**Week 8 - Excel Orientation:** The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler** - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text
LaTeX and MS/equivalent (FOSS) tool Power Point

**Week 9 - Task 1**: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes: PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint. Students will be given model power point presentation which needs to be replicated (exactly how it’s asked).

**Week 10 - Task 2**: Second Exercise helps students in making their presentations interactive. Topic covered during this Exercise includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

**Internet & World Wide Web 2 Weeks**

**Week 11 - Task 1: Orientation & Connectivity Boot Camp**: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

**Web Browsers, Surfing the Web**: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.

**Week 12 - Task 2: Search Engines & Netiquette**: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated by the student to the satisfaction of instructors.

**Cyber Hygiene**: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer.
REFERENCES:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. LaTeX Companion – Leslie Lamport, PHI/Pearson.
3. Introduction to Computers, Peter Norton, 6/e Mc Graw Hill
4. Upgrading and Repairing, PC’s 18th e, Scott Muller QUE, Pearson Education
5. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dreamtech
**(9ABS106) ENGINEERING PHYSICS LAB and ENGINEERING CHEMISTRY LAB**

**ENGINEERING PHYSICS LAB**

Any **TEN** of the following experiments are to be performed during the Academic year.

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Name of the Experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Dispersive power of the prism – Spectrometer.</td>
</tr>
<tr>
<td>4.</td>
<td>Determination of particle size by using a laser source.</td>
</tr>
<tr>
<td>5.</td>
<td>Determination of thickness of a thin wire using parallel fringes.</td>
</tr>
<tr>
<td>7.</td>
<td>Magnetic field along the axis of a current carrying coil – Stewart and Gee’s method.</td>
</tr>
<tr>
<td>8.</td>
<td>Numerical aperture of an optical fiber.</td>
</tr>
<tr>
<td>9.</td>
<td>Hall effect.</td>
</tr>
<tr>
<td>11.</td>
<td>Energy gap of a material of p-n junction</td>
</tr>
<tr>
<td>12.</td>
<td>Determination of rigidity modulus of a wire material – Torsional pendulum</td>
</tr>
<tr>
<td>13.</td>
<td>Determination of dielectric constant.</td>
</tr>
<tr>
<td>15.</td>
<td>Melde’s experiment – Transverse &amp; Longitudinal modes.</td>
</tr>
</tbody>
</table>
Equipment required:

Spectrometer, Grating, Prism, Mercury vapour lamp, Sodium vapour lamp, Travelling Microscope, Wedge arrangement, Newton rings setup, Stewart-Gee’s apparatus, He-Ne laser source, Optical fiber, Hall effect kit, B-H loop kit, Energy gap kit (four probe method), Torsional pendulum, Dielectric constant kit, Sonometer, Melde’s apparatus

ENGINEERING CHEMISTRY LAB

2. Preparation of Standard Potassium Dichromate and Estimation of Copper, by Iodometry.
4. Preparation of Standard EDTA and Estimation of Copper
5. Determination of Manganese in Steel and Iron in Cement.
6. Determination of strength of the given Hydrochloric acid against standard sodium hydroxide solution by Conducto metric titration
7. Determination of viscosity of the oils through Redwood viscometer
8. Determination of calorific value of fuel using Bomb calorimeter
9. Estimation of dissolved oxygen
10. Determination of Eutectic Temperature of binary system (Urea – Benzoic Acid)

BOOKS:
1. Chemistry-lab manual by Dr K.N.Jayaveera and K.B. Chandra Sekhar, S.M. Enterprizes Ltd.
Equipment Required:
1. Glass ware: Pipettes, Burettes, Volumetric Flasks, Beakers, Standard flasks, Measuring jars, Boiling Test tubes, reagent bottles, (Borosil)
2. Analytical balance (keroy) (15 Nos)
3. Calorimeter
4. Bomb Calorimeter
5. Redwood viscometer No.1 & No.2
6. Conductometer/ Conductivity bridge
7. Wash bottles, test tube stands, burette stands
8. Gas cylinders with Bunsen burners
9. Chemicals: Hydrochloric acid, sodium hydroxide, EDTA, EBT indicator, fast sulfon black-f, urea, benzoic acid, methanol, Mohr’s salt, copper sulphate, magnesium sulphate, ammonia, ammonium sulphate, calcium sulphate etc.,
(9ABS107) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

The Language Lab focuses on the production and practice of sounds of language and equips students with the use of English in everyday situations and contexts.

Objectives:
1. 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.
2. To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning.
3. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
4. To initiate them into greater use of the computer in resume preparation, report-writing, format-making etc.
5. 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.

SYLLABUS:
The following course content is prescribed for the English Language Laboratory sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Situational Dialogues (giving directions etc.)
4. Speaking on the mobiles and telephone conversation.
5. Role Play.
7. ‘Just A Minute’ Sessions (JAM).
8. Describing Objects / Situations / People.
9. Information Transfer
10. Debate

Minimum Requirement:
The English Language Lab shall have two parts:
i) The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.
ii) The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T.V., a digital stereo–audio & video system and camcorder etc.

System Requirement (Hardware component):
Computer network with Lan with minimum 60 multimedia systems with the following specifications:
   i) P – IV Processor
      a) Speed – 2.8 GHZ
      b) RAM – 512 MB Minimum
      c) Hard Disk – 80 GB
   ii) Headphones of High quality

PRESCRIBED SOFTWARE: GLOBARENA’S

Suggested Software:
• Cambridge Advanced Learners’ English Dictionary with CD.
• The Rosetta Stone English Library
• Clarity Pronunciation Power – Part I
• Mastering English in Vocabulary, Grammar, Spellings, Composition
• Dorling Kindersley series of Grammar, Punctuation, Composition etc.
• Language in Use, Foundation Books Pvt Ltd with CD
• Learning to Speak English - 4 CDs
• Microsoft Encarta with CD
• Murphy’s English Grammar, Cambridge with CD
• English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge
Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

3. **Speaking English Effectively**, Krishna Mohan & NP Singh (Macmillan)
8. **DELTA’s key to the Next Generation TOEFL Test**, 6 audio CDS, New Age International Publishers, 2007
UNIT – I


UNIT – II


UNIT – III

Elementary functions: Exponential, trigonometric, hyperbolic functions and their properties – General power $Z^c$ (c is complex), principal value.

UNIT – IV


UNIT – V

UNIT – VI
Evaluation of integrals of the type

(a) improper real integrals \[ \int_{a}^{\infty} f(x)dx \]

(b) \[ \int_{0}^{\infty} \frac{f(x)}{x} dx \]

(c) \[ \int_{0}^{\infty} \frac{e^{-x}f(x)}{x} dx \].

UNIT – VII

UNIT – VIII
Conformal mapping: Transformation by \( e^z, \ln z, z^2, \sin z, \cos z \), Bilinear transformation - Translation, rotation, magnification and inversion – Fixed point – Cross ratio – Determination of bilinear transformation mapping three given points.

TEXT BOOKS:

REFERENCES:
2. Complex Variables – Chruchile and Brown.
UNIT – I
MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: – Definition, Scope and Importance – Need for Public Awareness.

UNIT – II
NATURAL RESOURCES: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – III
ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological sucession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:
a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
UNIT – IV
BIODIVERSITY AND ITS CONSERVATION: Introduction

UNIT – V
ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of:
a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban and industrial waste – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – VI

UNIT – VII

UNIT – VIII
FIELD WORK: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds – river, hill slopes, etc..

TEXT BOOKS:
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCES:
2. Comprehensive Environmental Studies by J.P. Sharma, Laxmi publications.
4. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.
UNIT I
Fluid statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers.

UNIT II
Fluid kinematics: stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.

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

UNIT III
Closed conduit flow: Reynold’s experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line.

UNIT IV
Basics of turbo machinery: hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work don and efficiency, flow over radial vanes.
UNIT V
Hydroelectric power stations: Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

UNIT VI
Hydraulic Turbines: classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube-theory- functions and efficiency.

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

UNIT-VIII
Centrifugal pumps: classification, working, work done – manomertic head- losses and efficiencies- specific speed- pumps in series and parallel-performance characteristic curves, NPSH.

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

REFERENCE BOOKS:
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
UNIT- I
PN JUNCTION DIODE:

UNIT- II
RECTIFIERS AND FILTERS: PN Junction as a Rectifier, Half wave rectifier, ripple factor, full wave rectifier, Bridge Rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L-section filter, π-section filter, Use of Zener Diode as a Regulator, Problems on rectifier circuits, and voltage regulator.

UNIT- III

UNIT-IV
TRANSISTOR BIASING AND STABILISATION: Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Emitter Feedback Bias, Collector to Emitter Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization against Variations in $V_{BE}$ and $\beta$, Bias Compensation Using Diodes and Transistors, Thermal Runaway, Condition for Thermal Stability in CE configuration, Problems on biasing circuits.

UNIT- V
FIELD EFFECT TRANSISTOR:
The Junction Field Effect Transistor (Construction, Principle of Operation, Symbol) - Pinch-Off Voltage – Volt-Ampere Characteristics,
Small Signal Model of JFET & MOSFET, MOSFET Characteristics in Enhancement and Depletion Modes.

UNIT- VI
FET AMPLIFIERS:
Common Source, and Common Drain Amplifiers using FET, Generalized FET Amplifier, Biasing of FET, FET as Voltage Variable Resistor, Comparison between BJT and FET.

UNIT-VII
SMALL SIGNAL ANALYSIS OF BJT AMPLIFIERS:
BJT Modeling, Hybrid Modeling, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Analysis of CE, CB and CC configurations using h-Parameters, Comparison of CB, CE and CC configurations, Simplified Hybrid Model, Millers Theorem, Dual of Millers Theorem.

UNIT-VIII
SPECIAL PURPOSE ELECTRONIC DEVICES:

TEXT BOOKS:

REFERENCES:
3. Introduction to Electronic Devices and Circuits – Rober T. Paynter, PE
Objective:
This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes single phase circuits, magnetic circuits, theorems, transient analysis and network topology.

UNIT-I Introduction to Electrical Circuits
Circuit concept – R-L-C parameters-Voltage and Current sources-Independent and dependent sources-source transformation-Voltage - Current relationship for passive elements (for different input signals-square, ramp, saw tooth, triangular)

UNIT-II Network Analysis
Kirchoff’s laws – network reduction techniques-series, parallel, series parallel, star-to-delta or delta-to-star transformation, Nodal analysis, mesh analysis, super node and super mesh for D.C excitations.

UNIT-III Single Phase A.C Circuits
R.M.S , Average values and form factor for different periodic wave forms – sinusoidal alternating quantities – Phase and Phase difference – Complex and polar forms of representations, J-notation, Steady state analysis of R,L and C (in series, parallel and series parallel combinations) with sinusoidal excitation- Concept of power factor-Concept of Reactance, Impedance, Susceptance and Admittance-Real and Reactive power, Complex Power.
UNIT-IV Locus diagrams & Resonance
Locus diagrams - series R-L, R-C, R-L-C and parallel combination with variation of various parameters - Resonance-series, parallel circuits, concept of band width and Q factor.

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

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

UNIT-VII Network theorems -I
Thevenin’s, Norton’s, Maximum Power Transfer and Millman’s theorems for D.C and sinusoidal excitations.

UNIT-VIII Network theorems - II
Tellegen’s, Superposition, Reciprocity and compensation theorems for D.C and sinusoidal excitations.

TEXT BOOKS:
1. Circuits & Networks by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill
2. Electric Circuits by N.Sreenivasulu, REEM Publications
3. Electric Circuits- Schuam Series

REFERENCE BOOKS:
2. Basic circuit analysis by D.R. Cunningham & J.A Stuller, Jaico Publications
**Objective:**
Electrical machines course is one of the important courses of the Electrical discipline. In this course different types of DC generators and motors which are widely used in industry are covered and their performance aspects will be studied.

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

**UNIT – II  D.C. Generators – Construction & Operation**

**UNIT – III  Armature reaction in D.C. Generator**

**UNIT – IV  Types of D.C Generators**
Methods of Excitation – separately excited and self excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self excite and remedial measures.
UNIT – V  Load Characteristics of D.C.Generators
Load characteristics of shunt, series and compound generators – parallel operation of d.c series generators – use of equalizer bar and cross connection of field windings – load sharing.

UNIT – VI  D.C. Motors
D.C Motors – Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation.

UNIT – VII  Speed control of D.C. Motors
Speed control of d.c. Motors: Armature voltage and field flux control methods. Ward-Leonard system.
Principle of 3 point and 4 point starters – protective devices.

UNIT – VIII  Testing of D.C. Machines
Testing of d.c. machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency
Methods of Testing – direct, indirect and regenerative testing – brake test – Swinburne’s test – Hopkinson’s test – Field’s test – Retardation test – separation of stray losses in a d.c. motor test.

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

REFERENCE BOOKS:
1. Performance and Design of D.C Machines – by Clayton & Hancock, BPB Publishers
(9A01309) Basic FLUID MECHANICS AND HYDRAULIC MACHINES LAB

1. Impact of jets on Vanes
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine
4. Performance Test on Kaplan Turbine
5. Performance Test on Single Stage Centrifugal Pump
6. Performance Test on Multi Stage Centrifugal Pump
7. Performance Test on Reciprocating Pump
8. Calibration of Venturimeter
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.

Note: Any 10 of the above 12 experiments are to be conducted.
(9A04302) ELECTRONIC DEVICES AND CIRCUITS LAB
(Common to ECE, E Con E, EIE, ECM, EEE)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB’s
2. Identification, Specifications and Testing of Active Devices, Diodes, BJTs, Lowpower JFETs, MOSFETs, Power Transistors, LEDs, LCDs, SCR, UJT.
3. Study and operation of:
   - Multimeters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - Study and Operation of CRO.

(For Laboratory examination – Minimum of 10 experiments)

1. Forward and Reverse bias characteristics of PN Junction diode
2. Zener diode characteristics and Zener as Voltage Regulator.
3. Input and Output characteristics of Transistor in CB Configuration.
4. Input and Output characteristics of Transistor in CE Configuration.
5. Half Wave Rectifier With and without filters.
6. Full wave Rectifier With and without filters.
7. FET characteristics
8. Measurement of h parameters of transistor in CB, CE, CC configurations
12. SCR Characteristics.
13. UJT Characteristics.

**Equipment required for Laboratories:**

1. Regulated Power supplies (RPS) - 0-30v.
2. CROs - 0-20M Hz.
3. Function Generators - 0-1 M Hz.
4. Multimeters -

5. Decade Resistance Boxes/Rheostats -
6. Decade Capacitance Boxes -
7. Micro Ammeters (Analog or Digital) - 0-20 µA, 0-50µA, 0-100µA, 0-200µA.
8. Voltmeters (Analog or Digital) - 0-50V, 0-100V, 0-250V.
9. Electronic Components - Resistors, Capacitors, BJT, LCDs, SCR, UJT, FET, LED, MOSFET, Diodes (Ge& Si type), transistors (NPN & PNP type)
Objective:
The objective of this course is to introduce the concepts of electric field and magnetic fields and their applications which will be utilized in the development of the theory for power transmission lines and electrical machines.

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 – Properties of potential function – Potential gradient – Guass’s law – Application of Guass’s Law – Maxwell’s first law, \( \text{div } \mathbf{D} = \rho \text{v} \)

UNIT – II Conductors and Dipole:
Laplace’s and Poison’s equations – Solution of Laplace’s equation in one variable. Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behavior of conductors in an electric field – Conductors and Insulators.

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 – Current density – conduction and Convection current densities – Ohm’s law in point form – Equation of continuity
UNIT – IV  Magneto Statics :
Static magnetic fields – Biot-Savart’s law – Oesterd’s experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell’s second Equation, div(B)=0.

UNIT – V  Ampere’s circuital law and its applications
Ampere’s circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere’s circuital law – Maxwell’s third equation, Curl (H)=Jc, Field due to a circular loop, rectangular and square loops.

UNIT – VI  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

UNIT – VII  Magnetic Potential :
Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson’s equations.

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

UNIT – VIII  Time Varying Fields :
Time varying fields – Faraday’s laws of electromagnetic induction – Its integral and point forms – Maxwell’s fourth equation, Curl (E)=-B/t – Statically and Dynamically induced EMFs – Simple problems -
Modification of Maxwell’s equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

TEXT BOOKS
2. “Electro magnetic Fields” by Sadiku, Oxford Publications

REFERENCE BOOKS:
4. Electromagnetics – Theory & Applications- Ashutosh Pramanik - 2nd Edn, PHI
5. Electromagnetics – Problems with Solutions- Ashutosh Pramanik - 2nd Edn, PHI
(9A02403) GENERATION OF ELECTRIC POWER

Objective:
Electrical Power plays significant role in day-to-day life of entire mankind. This course concerns the generation of conventional and non-conventional sources of energy along with the economic aspects.

UNIT-1 Thermal Power Stations
Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses - Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers.

UNIT-2 Hydro and Nuclear Power Stations

Hydro Power Stations (HPS): Selection of site, Classification, Layout, Description of main components

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

UNIT -3 Basics of Solar Energy Generation

UNIT-4 Basics of Wind energy Generation
Role and potential of wind energy option, horizontal and vertical axis wind mills- performance characteristics- Betz criterion – application – Economic aspects.
UNIT-5 Basics of Bio gas Energy Generation
Principles of Bioconversion, types of Biogas digesters – Characteristics of Bio-gas- Utilization- Economic and environmental aspects.

UNIT-6 Basics of Geothermal and Ocean Energy Generation

UNIT-7 Economic Aspects of Power Generation

UNIT – 8 Tariff Methods
Desirable Characteristics of a Tariff Method.-Tariff Methods: Flat Rate, Block-Rate, two-part, three –part, and power factor tariff methods and Numerical Problems.

TEXT BOOKS

REFERENCE BOOKS
1. Elements of Power Station design and practice by M.V. Deshpande, Wheeler Publishing.
UNIT-I SINGLE STAGE AMPLIFIERS DESIGN AND ANALYSIS

UNIT-II BJT & FET FREQUENCY RESPONSE
Logarithms-Decibels-General frequency consideration-Low frequency analysis-Low frequency response of BJT amplifiers-Low frequency response of FET amplifier-Miller effect capacitance-High frequency response of BJT amplifier-Square wave testing

UNIT-III FEEDBACK AMPLIFIERS
Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics-Voltage series-Voltage shunt, Current series and Current shunt Feedback configurations-Simple problems.

UNIT-IV OSCILLATORS

UNIT -V LARGE SIGNAL AMPLIFIERS:
UNIT-VI LINEAR WAVESHAPING
High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs.

**Clippers and Clampers** - 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 VII SWITCHING CHARACTERISTICS OF DEVICES
Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

UNIT VIII MULTIVIBRATORS
Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using transistors.

TEXT BOOKS:

REFERENCES:
UNIT I
NUMBER SYSTEMS & CODES: Philosophy of number systems –
complement representation of negative numbers–binary arithmetic–
binary codes–error detecting & error correcting codes –hamming codes.

UNIT II
BOOLEAN ALGEBRA AND SWITCHING FUNCTIONS: Fundamental postulates of Boolean Algebra - Basic theorems and
properties - switching functions–Canonical and Standard forms-
Algebraic simplification digital logic gates, properties of XOR gates –
universal gates-Multilevel NAND/NOR realizations.

UNIT III
MINIMIZATION OF SWITCHING FUNCTIONS: Map method,
Prime implicants, Don’t care combinations, Minimal SOP and POS
forms, Tabular Method, Prime –Implicant chart, simplification rules.

UNIT IV
COMBINATIONAL LOGIC DESIGN
Design using conventional logic gates, Encoder, Decoder, Multiplexer,
De-Multiplexer, Modular design using IC chips, MUX Realization of
switching functions Parity bit generator, Code-converters, Hazards and
hazard free realizations.

UNIT V
PROGRAMMABLE LOGIC DEVICES, THRESHOLD LOGIC:
Basic PLD’s–ROM, PROM, PLA, PLD Realization of Switching
functions using PLD’s. Capabilities and limitations of Threshold gate,
Synthesis of Threshold functions, Multigate Synthesis.
UNIT VI
SEQUENTIAL CIRCUITS - I: Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Basic flip-flops-Triggering and excitation tables. Steps in synchronous sequential circuit design. Design of modulo-N Ring & Shift counters, Serial binary adder, sequence detector.

UNIT VII
SEQUENTIAL CIRCUITS - II: Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

UNIT VIII
ALGORITHMIC STATE MACHINES: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

TEXTBOOKS:

REFERENCES:
UNIT-I Three phase circuits- I
Three phase circuits: Phase sequence- Star and delta connection- Relation between line and phase voltages and currents in balanced systems- Analysis of balanced three phase circuits- Measurement of Active and Reactive power in balanced Three phase systems.

UNIT-II Three phase circuits- II
Analysis of Three Phase unbalanced circuits- Loop Method- Application of Millman’s Theorem- Star Delta Transformation Technique – Two Wattmeter Method of measurement of three phase power.

UNIT-III D.C Transient Analysis

UNIT-IV A.C Transient Analysis

UNIT-V Two Port Networks - I
Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations.

UNIT-VI Two Port Networks -II
Concept of transformed network - Two port network parameters using transformed variables-Cascaded networks.
UNIT-VII Fourier analysis of A.C Circuits
Fourier theorem- Trigonometric form and exponential form of Fourier series – conditions of symmetry- line spectra and phase angle spectra- Analysis of Electrical Circuits to Non sinusoidal periodic waveforms.

UNIT-VIII Fourier Transforms
Fourier Integrals and Fourier Transforms – properties of Fourier Transforms and Application to Electrical Circuits.

TEXT BOOKS:
1. Network Theory by N.Sreenivasulu, REEM Publications
2. Circuits & Networks by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill
3. Electric Circuits- Schuam Series

REFERENCE BOOKS:
2. Electric circuit Analysis by C.L. Wadhwa, New Age international
3. Electric circuits by David A. Bell, Oxford University press
Objective:
This subject facilitates to study the performance of Transformers which play a major role in transmission and distribution of electrical power and Induction motors which are the major part of industrial drives and agricultural pump sets.

UNIT-I: Single Phase Transformers – Construction & Operation
Single phase transformers-types - constructional details-minimization of hysteresis and eddy current losses-emf equation - operation on no load and on load - phasor diagrams

UNIT-II: Single Phase Transformers - Performance
Equivalent circuit - losses and efficiency-regulation. All day efficiency - effect of variations of frequency & supply voltage on iron losses.

UNIT-III: Testing of Single Phase Transformer and Autotransformer
OC and SC tests - Sumpner’s test - predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers.

UNIT-IV: Polyphase Transformers
Polyphase transformers - Polyphase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Third harmonics in phase voltages-three winding transformers-tertiary windings- Scott connection.

UNIT-V: Three phase Induction Motors
Polyphase induction motors-construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of
operation - rotor emf and rotor frequency - rotor reactance, rotor current and pf at standstill and during operation.

**UNIT-VI: Characteristics of Induction Motors**
Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - equivalent circuit - phasor diagram - crawling and coggging

**UNIT-VII: Circle Diagram of Induction Motors**
Circle diagram-no load and blocked rotor tests-predetermination of performance-methods of starting and starting current and torque calculations

**UNIT-VIII Speed Control Methods**
Speed control-change of frequency; change of poles and methods of consequent poles; cascade connection. injection of an emf into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

**TEXT BOOKS:**
2. Electrical machines-PS Bhimbra, Khanna Publishers.
3. Electromechanics – II, by Kamakshaiah

**REFERENCE BOOKS:**
1. Performance and Design of AC Machines by MG.Say, BPB Publishers
The following experiments are required to be conducted as 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, atleast any two of the experiments from the following list are required to be conducted:

PART-A: ELECTRICAL CIRCUITS

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

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
UNIT I: INTRODUCTION TO MANAGERIAL ECONOMICS
Definition, nature and scope of managerial economics- relation with other disciplines- Demand Analysis: Demand Determinants, Law of Demand and its exceptions

UNIT II: ELASTICITY OF DEMAND
Definition, Types, Measurement and Significance of Elasticity of Demand. Demand forecasting, factors governing demand forecasting, methods of demand forecasting (Survey methods, Statistical methods, Expert opinion method, Test marketing, Controlled experiments, Judgmental approach to Demand Forecasting)

UNIT III: THEORY OF PRODUCTION AND COST ANALYSIS
Production Function – Isoquants and Isocosts, MRTS, least cost combination of inputs, Cobb-Douglas production function, laws of returns, internal and external economies of scale.
Cost Analysis: Cost concepts, opportunity cost, fixed Vs variable costs, explicit costs Vs Implicit costs, out of pocket costs Vs Imputed costs. Break-Even Analysis (BEA) - Determination of Break Even Point (Simple Problems)- Managerial significance and limitations of BEA.

UNIT IV: INTRODUCTION TO MARKETS AND PRICING POLICIES
Market structures: Types of competition, features of perfect competition, monopoly- monopolistic competition. Price-Output determination under perfect competition and monopoly - Methods of Pricing-cost plus pricing, marginal cost, limit pricing, skimming pricing, bundling pricing, sealed bid pricing and peak load pricing.
UNIT V: BUSINESS ORGANISATIONS AND NEW ECONOMIC ENVIRONMENT
Characteristic features of business, features and evaluation of sole proprietorship, partnership, Joint Stock Company, public enterprises and their types, changing business environment in post-liberalization scenario.

UNIT VI: CAPITAL AND CAPITAL BUDGETING
Capital and its significance, types of capital, estimation of fixed and working capital requirements, methods and sources of raising finance. Nature and scope of capital budgeting, features of capital budgeting proposal, methods of capital budgeting – payback method, accounting rate of return (ARR) and Net present value method (Simple problems).

UNIT VII: INTRODUCTION TO FINANCIAL ACCOUNTING

UNIT VIII: FINANCIAL ANALYSIS THROUGH RATIOS
Computation, Analysis and Interpretation of financial statements through Liquidity Ratios (Current and Quick ratio), Activity ratios (Inventory Turnover Ratio and Debtor Turnover Ratio), Capital Structure Ratios (Debt- Equity Ratio, Interest Coverage Ratio) and Profitability ratios (Gross Profit Ratio, Net Profit Ratio, Operating Ratio, P/E Ratios and EPS), Du Pont Chart.

TEXT BOOKS:

REFERENCES
5. H.L. Ahuja: Managerial Economics, S.Chand, 3/e, 2009
Objective:
Electrical measurements course introduces the basic principles of all measuring instruments. It also deals with the measurement of RLC parameters voltage, current Power factor, power, energy and magnetic measurements and Digital Meters.

UNIT-I MEASURING INSTRUMENTS
Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, Dynamometer, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance.

UNIT –II INSTRUMENT TRANSFORMERS AND P.F METER
CT and PT – Ratio and phase angle errors – design considerations. Types of P.F. Meters – dynamometer and moving iron type – 1-ph and 3-ph meters.

UNIT –III MEASUREMENT OF POWER / ENERGY
Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques. Single phase induction type energy meter – driving and braking torques – errors and compensations. Three phase energy meter.

UNIT –IV POTENTIOMETERS
UNIT – V  D.C & A.C BRIDGES

UNIT – VI MAGNETIC MEASUREMENTS

UNIT – VII OSCILLOSCOPE
Cathode Ray Oscilloscope- Cathode Ray tube-Time base generator- Horizontal and Vertical amplifiers – application of CRO – Measurement of phase , frequency, current & voltage- Lissajous pattern

UNIT – VIII DIGITAL METERS
Digital Voltmeter-Successive approximation, ramp and integrating type-Digital frequency meter-Digital multimeter-Digital Tachometer

TEXT BOOK:

REFERENCE BOOKS:
1. Electrical Measurements – by Buckingham and Price, Prentice – Hall
Objective:
This course is an extension of Power systems-I course. It deals with basic theory of transmission lines modeling and their performance analysis. Also this course gives emphasis on mechanical design of transmission lines, cables and insulators.

UNIT-I TRANSMISSION LINE PARAMETERS
Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT-II PERFORMANCE OF SHORT AND MEDIUM TRANSMISSION LINES

UNIT-III PERFORMANCE OF LONG TRANSMISSION LINES
UNIT – IV  POWER SYSTEM TRANSIENTS
Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley’s Lattice Diagrams (for all the cases mentioned with numerical examples).

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

UNIT-VI  OVERHEAD LINE INSULATORS
Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

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

UNIT-VIII  UNDERGROUND CABLES
Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

TEXT BOOKS:
REFERENCE BOOKS:
Objective:
In this course it is aimed to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

UNIT – I INTRODUCTION
Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Examples of control systems-Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

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

UNIT-III TIME RESPONSE ANALYSIS

UNIT – IV STABILITY ANALYSIS IN S-DOMAIN
The concept of stability – Routh’s stability criterion – qualitative stability and conditional stability – limitations of Routh’s stability. The
root locus concept - construction of root loci-effects of adding poles and zeros to $G(s)H(s)$ on the root loci.

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

UNIT – VI STABILITY ANALYSIS IN FREQUENCY DOMAIN
Polar Plots-Nyquist Plots-Stability Analysis.

UNIT – VII CLASSICAL CONTROL DESIGN TECHNIQUES
Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, P, PD, PI, PID Controllers.

UNIT – VIII STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS
Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it’s Properties.

TEXT BOOKS:

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

UNIT – I  POWER SEMI CONDUCTOR DEVICES
Thyristors – Silicon Controlled Rectifiers (SCR’s) – BJT – Power MOSFET – Power IGBT and their characteristics and other thyristors – Basic theory of operation of SCR – Static characteristics – Turn on and turn off methods- Dynamic characteristics of SCR - Turn on and Turn off times - Salient points

UNIT – II  DEVICES AND COMMUTATION CIRCUITS

UNIT – III  SINGLE PHASE HALF CONTROLLED CONVERTERS
Phase control technique – Single phase Line commutated converters – Mid point and Bridge connections – Half controlled converters with Resistive, RL loads and RLE load – Derivation of average load voltage and current - Active and Reactive power inputs to the converters without and with Free wheeling Diode – Numerical problems

UNIT – IV  SINGLE PHASE FULLY CONTROLLED CONVERTERS
Fully controlled converters, Mid point and Bridge connections with Resistive, RL loads - Derivation of average load voltage and current –
Line commutated inverters -Active and Reactive power inputs to the converters without and with Free wheeling Diode, Effect of source inductance – Derivation of load voltage and current – Numerical problems.

UNIT – V THREE PHASE LINE COMMUTATED CONVERTERS
Three phase converters – Three pulse and six pulse converters – Mid point and bridge connections average load voltage With R and RL loads – Effect of Source inductance–Dual converters (both single phase and three phase) - Waveforms –Numerical Problems.

UNIT – VI AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS
AC voltage controllers – Single phase two SCR’s in anti parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor wave forms – Firing circuits -Numerical problems -Cyclo converters – Single phase mid point cyclo converters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cyclo converter (Principle of operation only) – Waveforms

UNIT – VII CHOPPERS

UNIT – VIII INVERTERS
TEXT BOOKS :

REFERENCE BOOKS :
4. Power Electronics - Essentials & Applications by L. Umanand, Wiley India Pvt. Ltd.
Objective :
This subject is an extension of previous machines courses. It deals with the detailed analysis of Synchronous generators and motors which are the prime source of electrical power generation and its utilities. Also concerns about the different types of single phase motors which are having significant applications in household appliances and control systems.

UNIT – I CONSTRUCTION AND PRINCIPLE OF OPERATION
Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation.

UNIT-I SYNCHRONOUS GENERATOR CHARACTERISTICS
Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

UNIT – III REGULATION OF SYNCHRONOUS GENERATOR

UNIT – IV PARALLEL OPERATION OF SYNCHRONOUS GENERATORS
Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current
wave form – determination of sub-transient, transient and steady state reactances.

UNIT – V  SYNCHRONOUS MOTORS – PRINCIPLE OF OPERATION
Theory of operation – phasor diagram – Variation of current and power factor with excitation – V and Inverted V Curves - Power developed – Synchronous Condenser.

UNIT-VI   POWER CIRCLES
Excitation and power circles – hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT – VII  SINGLE PHASE MOTORS

UNIT – VIII  SPECIAL MOTORS

TEXT BOOKS

REFERENCE BOOKS:
4. Electromachanics-III (Synchronous and single phase machines), S.Kamakashiah, Overseas publishers Pvt Ltd.

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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 a pair of 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, atleast 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

TEXT BOOKS:

1. Electrical Machines Lab manual with MATLAB Programs by Dr. D. K. Chaturvedi, University Science Press.
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. Transfer function of DC Machine
6. Effect of P, PD, PI, PID Controller on a second order systems
7. Lag and lead compensation – Magnitude and phase plot
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor

Any two simulation experiments are to be conducted:

1. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
2. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
3. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB
4. State space model for classical transfer function using MATLAB – Verification.
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.
UNIT I
INTRODUCTION TO MANAGEMENT:

UNIT II
DESIGNING ORGANIZATIONAL STRUCTURES:
Basic concepts related to Organisation - Departmentation and Decentralisation, Types of mechanistic and organic structures of organisation (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure) and their merits, demerits and suitability.

UNIT III
OPERATIONS MANAGEMENT:
Principles and Types of Plant Layout - Methods of production (Job, batch and Mass Production), Work Study - Basic procedure involved in Method Study and Work Measurement - Statistical Quality Control: chart, R chart, c chart, p chart, (simple Problems), Acceptance Sampling, Deming’s contribution to quality.
UNIT IV
MATERIALS MANAGEMENT:
Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.
Marketing: Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle, Channels of distribution

UNIT V
HUMAN RESOURCES MANAGEMENT (HRM):

UNIT VI
PROJECT MANAGEMENT (PERT/CPM):
Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (simple problems)

UNIT VII
STRATEGIC MANAGEMENT:

UNIT VIII
CONTEMPORARY MANAGEMENT PRACTICES:
Basic concepts of MIS, End User Computing, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma and Capability Maturity Model (CMM) Levels, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing
(BPO), Business Process Re-engineering and Benchmarking, Balanced Score Card.

TEXT BOOKS:

REFERENCES:
5. Memoria & S.V. Gauker, Personnel Management, Himalaya, 25/e, 2005
Objective:
This course is an extension of Power Electronics applications to AC and DC drives. Control of DC motor drives with single phase and three phase converters and choppers are given in detail. The control of AC motor drives with variable frequency converters and variable voltage are presented.

UNIT – I CONTROL OF DC MOTORS BY SINGLE PHASE CONVERTERS
Introduction to Thyristor controlled Drives, Single Phase semi and Fully controlled converters connected to d.c separately excited and d.c series motors – continuous current operation – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics- Problems on Converter fed d.c motors.

UNIT-II CONTROL OF DC MOTORS BY THREE PHASE CONVERTERS
Three phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque characteristics – Problems.

UNIT – III FOUR QUADRANT OPERATION OF DC DRIVES
Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.C motors by dual converters – Closed loop operation of DC motor (Block Diagram Only)
UNIT-IV CONTROL OF DC MOTORS BY CHOPPERS
Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors – Continuos current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on Chopper fed d.c Motors – Closed Loop operation ( Block Diagram Only)

UNIT – V CONTROL OF INDUCTION MOTOR THROUGH STATOR VOLTAGE
Variable voltage characteristics-Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics.

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

UNIT – VII CONTROL OF INDUCTION MOTOR FROM ROTOR SIDE
Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages - applications – problems

UNIT – VIII CONTROL OF SYNCHRONOUS MOTORS
TEXT BOOKS:
2. Power Electronic Circuits, Devices and applications by M.H.Rashid, PHI.

REFERENCE BOOKS:
2. Modern Power Electronics and AC Drives by B.K.Bose, PHI.
Objective:
This course introduces formation of Y bus and Z bus of a Power System, power flow studies by various methods. It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

UNIT I POWER SYSTEM NETWORK MATRICES-I
Representation of Power system elements, Essential characteristics of a good Algorithm, Steps involved in solving a problem using Digital computer - Graph Theory: Definitions, Bus Incidence Matrix, Ybus formation by Direct and Singular Transformation Methods, Numerical Problems.

UNIT II POWER SYSTEM NETWORK MATRICES-II
Formation of ZBus: Partial network, Algorithm for the Modification of ZBus Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).- Modification of ZBus for the changes in network ( Problems )

UNIT III POWER FLOW STUDIES-I
2009-10

UNIT – IV POWER FLOW STUDIES-II

UNIT – V SHORT CIRCUIT ANALYSIS-I

UNIT –VI SHORT CIRCUIT ANALYSIS-II

UNIT –VII POWER SYSTEM STEADY STATE STABILITY ANALYSIS

UNIT –VIII POWER SYSTEM TRANSIENT STATE STABILITY ANALYSIS
TEXT BOOKS:

REFERENCE BOOKS:
UNIT-I
INTRODUCTION
Architecture of 8086 microprocessor, special functions of general purpose registers. 8086 flag register and function of 8086 flags, addressing modes of 8086, instruction set of 8086, assembler directives, simple programs, procedures and macros.

UNIT-II
ASSEMBLY LANGUAGE PROGRAMMING
Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

UNIT-III
ARCHITECTURE OF 8086 & INTERFACING
Pin diagram of 8086-Minimum mode and maximum mode of operation, Timing diagram, memory interfacing to 8086 (static RAM and EPROM). Need for DMA. DMA data transfer method. Interfacing with 8237/8257.

UNIT-IV
PROGRAMMABLE INTERFACING DEVICES

UNIT-V
SERIAL DATA TRANSFER SCHEMES
Asynchronous and synchronous data transfer schemes. 8251 USART architecture and interfacing. TTL to RS232C and RS232C to TTL
conversion. Sample program of serial data transfer. Introduction to high-speed serial communications standards, USB.

UNIT-VI
PROGRAMMABLE INTERRUPT CONTROLLERS
PIC 8259, Programming with 8259, Programmable interval timer 8253, Modes of 8253, Programming examples with 8253.

UNIT-VII
8051 MICROCONTROLLER AND ITS PROGRAMMING

UNIT-VIII
ADVANCED MICROCONTROLLERS

TEXT BOOKS:


REFERENCES:

3. Micro computer system 8066/8088 family Architecture, programming and Design-By Liu and GA Gibson, PHI, 2nd Ed.
Objective:
This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

UNIT – I  ECONOMIC OPERATION OF POWER SYSTEMS-I

UNIT – II  ECONOMIC OPERATION OF POWER SYSTEMS-II
Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula.

UNIT – III  HYDROTHERMAL SCHEDULING

UNIT –IV  MODELING OF TURBINE, GOVERNOR

UNIT – V  LOAD FREQUENCY CONTROL - I
Necessity of keeping frequency constant.
Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Load frequency control of 2-area system – uncontrolled case and controlled case, tie-line bias control

UNIT-VI LOAD FREQUENCY CONTROL - II
Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency Control and Economic dispatch control.

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

UNIT – VIII POWER SYSTEM RESTRUCTURING [4]
Introduction – Need for Regulation – Motivation for Power System Restructuring – Key issues in Deregulation.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT I
INTEGRATED CIRCUITS:
Classification, chip size and circuit complexity, basic information of Opamp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

UNIT II
OP-AMP APPLICATIONS:
Basic application of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

UNIT III
ACTIVE FILTERS & OSCILLATORS:
Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters. Oscillator types and principle of operation – RC, Wien and quadrature type, waveform generators – triangular, sawtooth, square wave and VCO.

UNIT IV
TIMERS & PHASE LOCKED LOOPS:
Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT V
D-A AND A- D CONVERTERS:
Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of
ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC specifications.

UNIT VI
Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate- Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tristate outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT VII

UNIT VIII
SEQUENTIAL CIRCUITS:
Flip-flops & their conversions. Design of synchronous counters, Decade counter, shift registers & applications, familiarities with commonly available 74XX & CMOS 40XX series of IC counters.
MEMORIES: ROM architecture, types & applications, RAM architecture, Static & Dynamic RAMs, synchronous DRAMs.

TEXT BOOKS:

REFERENCES:
2. Operational Amplifiers & Linear Integrated Circuits: Theory & Applications – Denton J. Daibey, TMH.
1. Introduction

The Advanced English Language Skills Lab introduced at the 3rd year B.Tech level is considered essential for the student for focusing on his/her career. At this stage it is imperative for the student to start preparing for the ever growing competition in the job market. In this scenario, in order to be on par with the best, he/she needs to improve his/her Communication and soft skills.

This course focuses on the practical aspects of English incorporating all the four (LRSW) skills relevant to the requirements of the prospective employers in view of globalization. The proposed course will enable the students to perform the following:

- Intensive reading to improve comprehension and communication
- Attentive listening for better understanding
- Write project/research/technical reports
- Write Resume’ to attract attention
- Discuss ideas/opinions for better solutions
- Face interviews confidently
- Gather information, organize ideas, and present them effectively before an audience
- 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 GRE, TOEFL, CAT, GMAT etc.
2. Objectives:
Keeping in mind the previous exposure of the student to English, this lab focuses on improving the student’s proficiency in English at all levels. The lab intends to train students to use language effectively, to participate in group discussions, to help them face interviews, and sharpen public speaking skills and enhance the confidence of the student by exposing him/her to various situations and contexts which he/she would face in his/her career.

3. Syllabus
The following course content is prescribed for the Advanced Communication Skills Lab:

**Reading Comprehension** -- Reading for facts, guessing meanings from context, speed reading, scanning, skimming for building vocabulary (synonyms and antonyms, one word substitutes, prefixes and suffixes, idioms and phrases.)

**Listening Comprehension** -- Listening for understanding, so as to respond relevantly and appropriately to people of different backgrounds and dialects in various personal and professional situations.

**Technical Report Writing**—Types of formats and styles, subject matter, organization, clarity, coherence and style, data-collection, tools, analysis.

**Resume’ Writing**—Structure, format and style, planning, defining the career objective, projecting one’s strengths, and skills, creative self marketing, cover letter.

**Group Discussion**-- Communicating views and opinions, discussing, intervening, providing solutions on any given topic across a cross-section of individuals,(keeping an eye on modulation of voice, clarity, body language, relevance, fluency and coherence) in personal and professional lives.
Interview Skills—Concept and process, pre-interview planning, mannerisms, body language, organizing, answering strategies, interview through tele and video-conferencing

Technical Presentations (Oral)— Collection of data, planning, preparation, type, style and format ,use of props, attracting audience, voice modulation, clarity, body language, asking queries.

4. Minimum Requirements
The English Language Lab shall have two parts:

The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.
The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a TV, A digital stereo-audio and video system, Camcorder etc.

System Requirement (Hardware Component):
Computer network with LAN with a minimum of 60 multimedia systems with the following specifications:
P-IV Processor, Speed-2.8 GHz, RAM_512 MB minimum, Hard Disk-80 GB, Headphones

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

6. The ACE of Soft Skills by Gopal Ramesh and Mahadevan Ramesh, Pearson Education, 2010
9. From Campus To Corporate by KK Ramachandran and KK Karthick, Macmillan Publishers India Ltd, 2010
The following experiments are required to be conducted as compulsory experiments:

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. Measurement of % ratio error and phase angle of given C.T. by comparison.
7. Measurement of 3 phase reactive power with single-phase wattmeter.

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

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 Two watt meter method (Balanced & Un balanced).
12. Dielectric oil testing using H.T. testing Kit
13. LVDT and capacitance pickup – characteristics and Calibration
14. Resistance strain gauge – strain measurements and Calibration
15. Transformer turns ratio measurement using a.c. bridge.
UNIT – I GENERAL CONCEPTS
Introduction to distribution systems, Load modelling and characteristics. Coincidence factor, contribution factor loss factor - Relationship between the load factor and loss factor. Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

UNIT – II GENERAL ASPECTS OF D.C. DISTRIBUTION SYSTEMS
Classification of Distribution Systems - Comparison of DC vs AC and Under-Ground vs Over - Head Distribution Systems- Requirements and Design features of Distribution Systems- Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

UNIT III A.C. DISTRIBUTION SYSTEMS.
Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system.
Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

UNIT – IV SUBSTATIONS
Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.
Classification of substations: Air insulated substations - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment.
Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar Double breaker – One and half breaker system with relevant diagrams.

UNIT – V POWER FACTOR AND VOLTAGE CONTROL
Dependency of Voltage on Reactive Power flow.- Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers

UNIT – VI SYSTEM ANALYSIS
Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT – VII COMPENSATION FOR POWER FACTOR IMPROVEMENT
Capacitive compensation for power-factor control - effect of shunt capacitors (Fixed and switched), Power factor correction- Economic justification - Procedure to determine the best capacitor location.

UNIT – VIII PROTECTION AND COORDINATION OF DISTRIBUTION SYSTEMS

TEXT BOOK:

REFERENCE BOOK:
1. Electric Power Distribution Automation by Dr. M. K. Khedkar and Dr. G. M. Dhole, University Science Press.
UNIT-I
INTRODUCTION
Introduction to digital signal processing: discrete time signals and sequences, linear shift invariant systems, stability and causality, linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

UNIT-II
DISCRETE FOURIER SERIES
Properties of discrete Fourier series, DFS representation of periodic sequences, discrete Fourier transforms: properties of DFT, linear convolution of sequences using DFT, computation of DFT. Relation between Z-Transform and DFS.

UNIT-III
FAST FOURIER TRANSFORMS
Fast Fourier transforms (FFT)-Radix2 decimation in time and decimation in frequency FFT algorithms, inverse FFT and FFT for composite N.

UNIT-IV
REALIZATION OF DIGITAL FILTERS
Review of Z-transforms, applications of Z-Transforms, solution of difference equations of digital filters, block diagram representation of linear constant-coefficient difference equations, basic structures of IIR systems, transposed forms, basic structures of FIR systems, system function.
UNIT-V
IIR DIGITAL FILTERS
Analog filter approximations-Butterworth and chebyshev, design of IIR digital filters from analog filters, design examples: analog-digital transformations, Illustrative Problems.

UNIT-VI
FIR DIGITAL FILTERS

UNIT-VII
MULTIRATE DIGITAL SIGNAL PROCESSING FUNDAMENTALS:
Basic sample rate alteration devices, Multirate Structures for sampling rate Converters, Multistage design of decimator and Interpolator, Polyphase Decomposition, Nyquist filters.

UNIT-VIII
APPLICATIONS OF DIGITAL SIGNAL PROCESSING

TEXT BOOKS:

REFERENCES:
**UNIT-I INTRODUCTION**
Comparison of AC and DC Transmission systems, Application of D.C. Transmission, Types or DC links, Typical layout of a HVDC converter station. HVDC converters, pulse number, Analysis of & phase Bridge circuit with and without overlap, converter Bridge characteristics, equivalent circuits or Rectifier and inverter configurations Twelve pulse converters.

**UNIT -II CONVERTER AND HVDC SYSTEM CONTROL**
Principles of DC links control, converter control characteristics, system control Hierarchy, Firing angle control, current and extinction Angle control starting and stopping of DC link.

**UNIT -III HARMONICS, FILTERS AND REACTIVE POWER CONTROL**
Introduction, generation of Harmonics, AC and DC Filters, Reactive power requirements at steady state, sources of Reactive power static Var systems.

**UNIT -IV POWER FLOW ANALYSIS IN AC/DC SYSTEMS**
Introduction, Modeling of DC/AC converters, controller equations, solutions of AD/DC load flow- simultaneous approach and sequential approach.

**UNIT – V FACTS CONCEPTS**
Flow of power in AC parallel paths and Meshed systems. Basic types of FACTS controllers, Brief description and Definitions of FACTS controllers.
UNIT - VI STATIC SHUNT COMPENSATORS
Objectives of shunt compensation, Methods of controllable VAR generation, Static VAR compensators, SVC and STATCOM, comparison.

UNIT - VII STATIC SERIES COMPENSATORS
Objectives of series compensation, variable impedance type-thyristor switched series capacitors (TCSC), switching converter type series compensators – static series synchronous compensator (SSSC) – power angle characteristics – Basic operating control Schemes.

UNIT - VIII COMBINED COMPENSATORS
Introduction, unified power flow controller (UPFC), Basic operating principle, Independent real and reactive power flow controller, control structure.

TEXT BOOKS:
1. HVDC power Transmission systems by K.R. Padiyar, Wiley Eastern Limited

REFERENCE BOOKS:
Objective:
This course introduces all varieties of Circuit Breakers and Relays for protection of Generators, Transformers and feeder bus bars from over voltages and other hazards. It emphasis on Neutral grounding for overall protection.

UNIT – I CIRCUIT BREAKERS-1

UNIT –II CIRCUIT BREAKERS-2
Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT – III ELECTROMAGNETIC RELAYS
Basic Requirements of Relays – Primary and Backup protection - Construction details of – Attracted armature, balanced beam, inductor type and differential relays – Universal Torque equation – Characteristics of over current, Direction and distance relays.

UNIT – IV STATIC AND MICROPROCESSOR BASED RELAYS
Static Relays – Advantages and Disadvantages – Definite time, Inverse and IDMT static relays – Comparators – Amplitude and Phase comparators. Microprocessor based relays – Advantages and Disadvantages – Block diagram for over current (Definite, Inverse and IDMT) and Distance Relays and their Flow Charts.
UNIT – V  GENERATOR PROTECTION
Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.

UNIT – VI  TRANSFORMER PROTECTION

UNIT – VII  PROTECTION OF FEEDERS AND TRANSMISSION LINES
Protection of Feeder (Radial & Ring main) using over current Relays. Protection of Transmission line – 3 Zone protection using Distance Relays. Carrier current protection. Protection of Bus bars.

UNIT – VIII  PROTECTION AGAINST OVER VOLTAGES
Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination –BIL.

TEXT BOOKS:

REFERENCE BOOKS:
Objective:
Instrumentation is essential in monitoring and analysis of any physical system and its control. This course deals with different types of transducers, digital voltmeters, oscilloscopes and measurement of non electrical quantities.

UNIT-I CHARACTERISTICS OF SIGNALS

UNIT-II SIGNALS AND THEIR REPRESENTATION
Signal and their representation: Standard Test, periodic, aperiodic, modulated signal, sampled data, pulse modulation and pulse code modulation

UNIT-III DATA TRANSMISSION AND TELEMETRY

UNIT-IV DATA ACQUISITION SYSTEM (DAS)
UNIT-V  SIGNAL ANALYZERS
Wave Analysers- Frequency selective analyzers, Heterodyne, Application of Wave analyzers- Harmonic Analyzers, Total Harmonic distortion, spectrum analyzers, Basic spectrum analyzers, spectral displays, vector impedance meter, Q meter. Peak reading and RMS voltimeters

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

UNIT-VII  MEASUREMENT OF NON-ELECTRICAL QUANTITIES-I

UNIT-VIII  MEASUREMENT OF NON-ELECTRICAL QUANTITIES-II
Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

TEXT BOOKS:
1. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India

REFERENCE BOOKS:
2. Principles of Measurement and Instrumentation – by A.S Morris, Pearson /Prentice Hall of India

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Objective;
This subject deals with the detailed analysis of Breakdown occur in gaseous, liquids and solid dielectrics. Information about generation and measurement of High voltage and current. In addition the High voltage testing methods are also discussed.

UNIT - I INTRODUCTION
Introduction to HV technology, need for generating high voltages in laboratory. Industrial applications of high voltage, Electrostatic precipitation, separation.

UNIT - II BREAK DOWN IN GASEOUS AND LIQUID DIELECTRICS
Gases as insulating media, collision process, Ionization process, Townsend’s criteria of breakdown in gases, Paschen’s law, Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids.

UNIT - III BREAK DOWN IN SOLID DIELECTRICS
Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT – IV GENERATION OF HV AC AND DC VOLTAGE
HV AC-HV transformer: Need for cascade connection and working of transformers units connected in cascade. Series resonant circuit-principle of operation and advantages - Tesla coil - HV DC- voltage doubler circuit, Cockroft- Walton type high voltage DC set - Calculation of high voltage regulation, ripple and optimum number of stages for minimum voltage drop.
UNIT - V  GENERATION OF IMPULSE VOLTAGE AND CURRENT:
Introduction to standard lightning and switching impulse voltages - Analysis of single stage impulse generator-expression for Output impulse voltage - Multistage impulse generator working of Marx impulse generator, Rating of impulse generator - Components of multistage impulse generator - Triggering of impulse generator by three electrode gap arrangement - Trigatron gap and oscillograph time sweep circuits, Generation of switching impulse voltage - Generation of high impulse current.

UNIT – VI  MEASUREMENT OF HIGH VOLTAGES:

UNIT – VII  NON-DESTRUCTIVE INSULATION TESTING TECHNIQUES
Dielectric loss and loss angle measurements using Schering Bridge - Transformer ratio Arms Bridge. Need for discharge detection and PD measurements aspects - Factors affecting the discharge detection, Discharge detection methods-straight and balanced methods.

UNIT – VIII  HIGH VOLTAGE TESTS ON ELECTRICAL APPARATUS
Definitions and terminology, tests on isolators, circuit breakers, cables, insulators and transformers.

TEXT BOOKS:

REFERENCE BOOKS:
Objective:
It introduces solar energy its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, Geothermal energy and ocean energy as alternative energy sources.

UNIT – I
PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II
SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT-III

UNIT-IV
WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

UNIT-V
BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion
characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-VI
GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT-VII
OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-VIII
DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC.

TEXT BOOKS:
1. Non-Conventional Energy Sources by G.D. Rai, Khanna Publishers

REFERENCE BOOKS:
1. Renewable energy resources by Tiwari and Ghosal, Narosa.
2. Renewable Energy Technologies by Ramesh & Kumar, Narosa.
4. Renewable energy sources and emerging technologies by D.P.Kothari,K.C.Singhal, PHI.
**Objective:**
This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks. Also deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components along with Genetic Algorithms. The Application of Soft Computing Techniques to Electrical Engineering is also presented.

**UNIT – I ARTIFICIAL NEURAL NETWORKS**
Introduction, Biological Neuron, Artificial Neuron, Basic concepts of Neural Networks, Basic Models of ANN Connections, McCulloch-Pitts Model, Characteristics of ANN, Applications of ANN.

**UNIT- II ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS**
Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

**UNIT–III SUPERVISED LEARNING NETWORKS**
UNIT IV ASSOCIATIVE MEMORY NETWORK
Training Algorithms for Pattern Association, Auto Associative Memory Network, Hetero Associative Memory Network, BAM, Hopfield Networks.

UNIT – V CLASSICAL & FUZZY SETS
Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT VI FUZZY LOGIC SYSTEM COMPONENTS
Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT VII GENETIC ALGORITHMS
Introduction, Basic Operators and Terminologies in GA, Traditional Vs Genetic Algorithm, Encoding, Fitness Function, Reproduction, Crossover, Mutation Operator.

UNIT VIII APPLICATIONS TO ELECTRICAL SYSTEMS
ANN based Short term Load Forecasting, Load flow Studies, Fuzzy logic based Unit Commitment and Genetic Algorithm based Economic Dispatch.

TEXT BOOKS
2. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Pai – PHI Publications.

REFERENCE BOOKS:
2. Neural Networks – Simon Hakins , Pearson Education
4. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.
UNIT – I  BASICS OF PROBABILITY THEORY & DISTRIBUTION

UNIT – II  NETWORK MODELLING AND RELIABILITY ANALYSIS

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

UNIT – IV  MARKOV MODELLING
UNIT – V  FREQUENCY & DURATION TECHNIQUES
Frequency and duration concept – Evaluation of frequency of encountering state, mean cycletime, for one, two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering of merged states.

UNIT – VI  GENERATION SYSTEM RELIABILITY ANALYSIS

UNIT – VII  COMPOSITE SYSTEM RELIABILITY ANALYSIS

UNIT – VIII  DISTRIBUTION SYSTEM AND RELIABILITY ANALYSIS

TEXT BOOKS:
UNIT – I INTRODUCTION AND CLASSICAL OPTIMIZATION TECHNIQUES

UNIT – II CLASSICAL OPTIMIZATION TECHNIQUES

UNIT – III LINEAR PROGRAMMING

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

UNIT – V UNCONSTRAINED NONLINEAR PROGRAMMING
One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method

UNIT – VI UNCONSTRAINED OPTIMIZATION TECHNIQUES
Univariate method, Powell’s method and steepest descent method.
UNIT – VII  CONstrained Nonlinear Programming
Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

UNIT – VIII DYNAMIC PROGRAMMING

TEXT BOOKS:

REFERENCE BOOKS:
I. Microprocessor 8086:

Introduction to MASM/TASM.

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.

Modular Program: Procedure, Near and Far implementation, Recursion.

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

II. Interfacing

8259 – Interrrupt Controller.
8279 – Keyboard Display.
8255 – PPI.
8251 – USART.

III. Microcontroller 8051:

1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.
4. Understanding three memory areas of 00 – FF (Programs using above areas).
5. Using external interrupts
6. Programs using special instructions like swap, bit/byte, set/reset etc.
7. Programs based on short, page, absolute addressing.
Any Eight of the Experiments in Power Electronics Lab

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, and Class D & Class E)
6. DC Jones chopper with R and RL Loads
7. Single Phase Parallel, inverter with R and RL loads
8. Single Phase Cycloconverter 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 converter with R and RL loads
13. Single Phase dual converter with RL loads

Any two simulation experiments with PSPICE/PSIM

PSPICE simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.

PSPICE simulation of resonant pulse commutation circuit and Buck chopper.

PSPICE simulation of single phase Inverter with PWM control.
REFERENCE BOOKS:
1. Simulation of Electric and Electronic circuits using PSPICE – by M.H.Rashid, PHI.
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.
UNIT-I INTRODUCTION
What is power quality? Power quality – voltage quality, why are we concerned about power quality?, the power quality Evaluation procedure, Terms and Definitions, Transients, Long-duration voltage variations, short-voltage variations, voltage imbalance, wave form distortion, voltage fluctuation, power frequency variations, power quality terms CBEMA and ITI curves.

UNIT-II VOLTAGE SAGS AND INTERRUPTIONS
Sources of sagas and interruptions, Estimating voltage sag performance, fundamental principles of protection, solutions at the end-use level, Motor-starting sags, utility system fault-clearing issues.

UNIT-III TRANSIENT OVER VOLTAGES
Sources of over voltages, principles of over voltage protection, devices for over voltage protection, utility capacitor-switching transients, utility system lightning protection.

UNIT-IV FUNDAMENTALS OF HARMONICS
Harmonic Distortion, Voltage versus current distortion, Harmonics versus Transients, power system qualities under non sinusoidal conditions, Harmonic indices, Harmonic sources from commercial loads, Harmonic sources from Industrial loads

UNIT-V APPLIED HARMONICS
Effects of Harmonics, Harmonic distortion evaluations, Principles of Controlling Harmonics, Devices for Controlling Harmonic Distortion

UNIT-VI LONG-DURATION VOLTAGE VARIATIONS
Principles of regulating the voltage, Devices for voltage regulation, utility voltage regulator Application, capacitors for voltage regulation flicker.

UNIT-VII POWER QUALITY BENCHMARKING
Benchmarking process, RMS Voltage variation Indices, Harmonics indicesPower Quality Contracts
UNIT – VIII POWER QUALITY MONITORING
Monitoring considerations, power quality measurement equipment, Power quality Monitoring standards

TEXT BOOKS:
2. Power quality by C. Sankaran, CRC Press

REFERENCE BOOKS:
1. Electrical systems quality Assessment by J. Arrillaga, N.R. Watson, S. Chen, John Wiley & Sons
Objective:
It deals with the illumination, Electrical heating, Welding, Electrolytic Process and Electric Traction.

UNIT – I ILLUMINATION

UNIT – II ELECTRICAL HEATING

UNIT – III ELECTRIC WELDING

UNIT – IV ELECTROLYTIC PROCESS
Electrolysis - Faradays laws, Application of Electrolysis, Power supply for Electrolysis.

UNIT – V ELECTRIC DRIVES

UNIT – VI ELECTRIC TRACTION – I

UNIT – VII ELECTRIC TRACTION – II
UNIT – VIII ELECTRIC TRACTION-III
Calculations of tractive effort, Power, specific energy consumption -
effect of varying acceleration and braking retardation, Adhesive weight
and coefficient of adhesion – Problems.

TEXT BOOK:
1. Utilization of Electric Energy – by E. Openshaw Taylor and V. V.
   L. Rao, Universities Press.
   Publications.

REFERENCE BOOKS:
1. Utilization of Electrical Power including Electric drives and
   Electric traction – by N.V.Suryanarayana, New Age International
2. Art & Science of Utilization of electrical Energy – by Partab,
   Dhanpat Rai & Co.
Objective:
This subject deals with state space, describing function, phase plane and
stability analysis including controllability and observability. It also
deals with modern control and optimal control systems.

UNIT – I STATE VARIABLE DESCRIPTION
Concept of State – State Equations for Linear Continuous time Models
– Non uniqueness of state model – State diagrams for continuous time
state models – Solution of state equations – State transmission matrix.

UNIT – II CONTROLLABILITY AND OBSERVABILITY
Tests for controllability and observability for continuous time systems –
Time varying case, minimum energy control, time invariant case,
Principle of Duality, Controllability and observability of state models in
Jordan canonical form and other canonical forms.

UNIT – III MODAL CONTROL
Effect of state feedback on controllability and observability, Design of
State Feedback Control through Pole placement. Full order observer and
reduced order observer.

UNIT – IV DESCRIBING FUNCTION ANALYSIS
Introduction to nonlinear systems. Types of nonlinearities, Concepts of
describing functions, Derivation of describing functions for Dead zone,
Saturation, backlash, relay with dead zone and Hysteresis - Jump
Resonance.

UNIT-V PHASE-PLANE ANALYSIS
Introduction to phase-plane analysis. Method of Isoclines for
Constructing Trajectories, Singular points, Phase-plane analysis of
nonlinear control systems.

UNIT-VI STABILITY ANALYSIS
Stability in the sense of Lyapunov. Lyapunov’s stability and Lypanov’s
instability theorems. Direct method of Lypanov for the Linear and
Nonlinear continuous time autonomous systems.
UNIT – VII  OPTIMAL CONTROL

UNIT-VIII  CALCULUS OF VARIATIONS

TEXT BOOKS:


REFERENCE BOOKS:

UNIT – I SPECIAL TYPES OF D. C. MACHINES - I
Series booster – Shunt booster – Non – reversible booster – Reversible booster

UNIT – II SPECIAL TYPES OF D.C. MACHINES - II

UNIT – III STEPPER MOTORS

UNIT – IV VARIABLE RELUCTANCE STEPPING MOTORS

UNIT – V SWITCHED RELUCTANCE MOTOR
Introduction – Improvements in the Design of Conventional reluctance Motors – Some Distinctive Differences between SR and Conventional

UNIT – VI PERMANENT MAGNET MATERIALS AND MOTORS

UNIT – VII BRUSHLESS DC MOTOR

UNIT – VIII LINEAR INDUCTION MOTOR
Development of a Double sided LIM from Rotary type IM – A Schematic of LIM Drive for Electric Traction – Development of one sided LIM with back Iron – Field Analysis of a DSLIM: Fundamental Assumptions.

TEXT BOOKS:

1. K. Venkataratnam, Special Electrical Machines, University Press.
   [For Chapters I and II refer Chapter VIII of this book]
UNIT-I
PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming Equipment, programming formats, construction of PLC ladder diagrams, Devices connected to I/O modules.

UNIT-II
PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation.

UNIT-III
Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder Diagrams for process control: Ladder diagrams & sequence listings, ladder diagram construction and flowchart for spray process system.

UNIT-IV
PLC Registers: Characteristics of Registers, module addressing, holding registers, Input Registers, Output Registers.

UNIT-V
PLC Functions: Timer functions & Industrial applications, counter function & industrial applications, Arithmetic functions, Number comparison functions, number conversion functions

UNIT-VI
Data Handling functions: SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR & Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two-axis & three axis Robots with PLC, Matrix functions.

UNIT-VII
UNIT-VIII

Text Books:

Reference Books:
UNIT- I OVERVIEW OF EMBEDDED SYSTEM

UNIT-II PROCESSOR & MEMORY ORGANIZATION
Structural units in a processor, Processor selection, Memory devices, Memory selection, Memory Allocation & Map; Interfacing

UNIT-III DEVICES & BUSSES FOR DEVICE NETWORKS
I/O devices, Timer & Counter devices, Serial Communication, Communication between devices using different buses.

UNIT-IV DEVICE DRIVERS AND INTERRUPT SERVICING MECHANISM
Device drives, Parallel and serial port device drives in a system, Interrupt servicing mechanism, context and periods for context switching, Deadline and Interrupt Latency.

UNIT V PROGRAM MODELING CONCEPTS

UNIT VI SOFTWARE ENGINEERING PRACTICES
Software algorithm Concepts, design, implementation, testing, validating, debugging, Software Management and maintenance.

UNIT-VII HARDWARE AND SOFTWARE CO-DESIGN
Embedded system design and co design issues in software development, design cycle in development phase for Embedded System, Use of ICE & Software tools for development of ES, Issues in embedded system design.
UNIT VIII  RTOS

TEXT BOOKS:


REFERENCES:
UNIT – I DESIGN ASPECTS OF ELECTRICAL SYSTEMS
Role of Statutes in Electrical System Design, Classification of Building Services, Design Aspects of Lighting, Design Aspects of Ventilation, Design Aspects of Climate Control, Design Aspects of Vertical Transportation, Design Aspects of Minor Building Services.

UNIT – II ELECTRICAL INSTALLATIONS IN DOMESTIC BUILDINGS
Classification, Estimation of Load Requirements, Selection of Type of Wiring, Special Features Applicable for High-Rise Apartment Buildings, Pre-commissioning Tests.

UNIT – III INDUSTRIAL INSTALLATIONS - I
Classification of Industrial Installation, General Characteristics, Selection of Distribution Architecture, Selection of Transformers and Sub Stations

UNIT – IV INDUSTRIAL INSTALLATIONS - II

UNIT – V POWER FACTOR IMPROVEMENT

UNIT – VI POWER SYSTEM EARTHING
Introduction, Earthing, Types of System Earthing, Reasons for Grounding/ Earthing, TN System, TT System, IT System, Protective Measures and Protective Devices in IT System, Main Characteristics of

UNIT – VII  POWER QUALITY ISSUES AND RESONANCE PROBLEMS IN SYSTEMS DESIGN

UNIT – VIII  ENERGY ECONOMICS IN SYSTEM DESIGN
Introduction, Time Value of Money, Single Payment Compound Amount Model (SPCA), Uniform Series Compound Amount Model (USCA), Uniform Series Present Worth Model (USPW), Depreciation, Tax Considerations, After Tax Analysis.

TEXT BOOK:
2. Design of Electrical Installations – by Er. V. K. Jain and Er. Amitabh Bajaj, University Science Press.
UNIT - I  INTRODUCTION
Energy situation – world and India, energy consumption, conservation, Codes, standards and Legislation.

UNIT - II  ENERGY AUDITING
Energy audit- definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes. Measurements in energy audits, presentation of energy audit results.

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

UNIT - IV  POWER FACTOR IMPROVEMENT
Power factor – methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on p.f. , p.f motor controllers.

UNIT – V LIGHTING AND ENERGY INSTRUMENTS
Good lighting system design and practice, lighting control ,lighting energy audit - Energy Instruments- watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers ,application of PLC’s
UNIT – VI ENERGY ECONOMIC ANALYSIS
The time value of money concept, developing cash flow models, payback analysis, depreciation, taxes and tax credit – numerical problems.

UNIT – VII DEMAND SIDE MANAGEMENT - I
Introduction to DSM, concept of DSM, benefits of DSM, different techniques of DSM – time of day pricing, multi-utility power exchange model, time of day models for planning.

UNIT – VIII DEMAND SIDE MANAGEMENT - II
Load management, load priority technique, peak clipping, peak shifting, valley filling, strategic conservation, energy efficient equipment. Management and Organization of Energy Conservation awareness Programs.

TEXT BOOK:

REFERENCES:
3. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995-
5. Energy management and good lighting practice : fuel efficiency- booklet12-EEO
8. Hand book on energy auditing - TERI (Tata Energy Research Institute)