ACADEMIC REGULATIONS 2013

(Effective for the students admitted into I year from the Academic Year 2013-2014 and onwards)

1. Award of B. Tech. Degree:
A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfills the following academic regulations.
(a) Pursued a course of study for not less than four academic years and not more than eight academic years.
(b) Registered for 180 credits and he/she must secure total 180 credits.

2. Students, who fail to complete their Four years Course of study within 8 years or fail to acquire the 180 Credits for the award of the degree within 8 academic years from the year of their admission, shall forfeit their seat in B. Tech course and their admission shall stand cancelled.

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

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Branch Code-Abr.</th>
<th>Branch</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>01-CE</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td>02</td>
<td>02-EEE</td>
<td>Electrical and Electronics Engineering</td>
</tr>
<tr>
<td>03</td>
<td>03-ME</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>04</td>
<td>04-ECE</td>
<td>Electronics and Communication Engineering</td>
</tr>
<tr>
<td>05</td>
<td>05-CSE</td>
<td>Computer Science and Engineering</td>
</tr>
<tr>
<td>06</td>
<td>12-IT</td>
<td>Information Technology</td>
</tr>
</tbody>
</table>

And any other course as approved by the authorities of the University from time to time.
4. Credits (Semester system from I year onwards):

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Theory Course</td>
<td>02/03</td>
</tr>
<tr>
<td>2</td>
<td>Laboratory Course</td>
<td>02</td>
</tr>
<tr>
<td>3</td>
<td>Advanced Laboratory Course</td>
<td>03</td>
</tr>
<tr>
<td>3</td>
<td>Self Study course/Internship</td>
<td>01</td>
</tr>
<tr>
<td>4</td>
<td>Employability skills</td>
<td>02</td>
</tr>
<tr>
<td>5</td>
<td>Project</td>
<td>06</td>
</tr>
</tbody>
</table>

5. Evaluation Methodology:

The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for theory course and 75 marks for laboratory and other courses. The project work shall be evaluated for 200 marks.

5.1 Theory course:

For theory courses the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End - Examinations. Out of 30 internal marks – 25 marks are assigned for descriptive exam and 5 marks for assignments.

(i) Pattern for Internal Midterm Examinations (25 marks):

For theory courses of each semester there shall be 3 Midterm descriptive/objective exams. Each descriptive/objective exam consists of 120 minutes duration for 25 marks. The average of the best two out of three Mid exams will be taken for the assessment of internal marks.

The first Midterm examination to be conducted usually after 5 weeks of instruction, the second Midterm examination to be conducted usually after 11 weeks of instruction and the third Midterm examination will be conducted usually after 17 weeks of instruction. Each Midterm question paper shall contain 4 questions, out of 4 questions first question is objective type which contains 10 questions with 1 mark each (10 x 1 =10M) and remaining 3 questions are descriptive type (3 x 10= 30M). The student should answer all 4 questions.

(ii) Pattern for External End Examinations (70 marks):

(a) There shall be an external examination for every theory course and consists of two parts (part-A and part-B). The duration of the time for this end examination is 3 hours.

(b) Part-A shall contain 10 marks , which is compulsory. It has 10 short questions with 1 mark each (10x1=10M). Two questions will be given from each unit.
(c) Part-B of the question paper shall have descriptive type questions for 60 marks. There shall be two questions from each unit with internal choice. Each question carries 12 marks. Each course shall consist of 5 units of syllabus.

5.2 Laboratory Course:

(i) (a) For practical subjects there shall be continuous evaluation during the semester for 25 internal marks and 50 semester end examination marks. Out of the 25 marks for internal: 10 marks for day to day work, 5 for record and 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner from outside the college.

(b) For the benefit of the students, two advanced labs are introduced with some specialized areas in each B.Tech. Program.

(ii.) For the course having design and / or drawing, (such as Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (15 marks for day – to – day work, and 15 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester and the average of the two shall be considered for the award of marks for internal tests.

5.3 Project Work:

Out of a total of 200 marks for the project work, 60 marks shall be for Project Internal Evaluation and 140 marks for the End Semester Examination. The End Semester Examination (Viva – Voce) shall be conducted by the committee. The committee consists of an external examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be made at the end of the IV year. The Internal Evaluation shall be made on the basis of two seminars given by each student on the topic of his project which was evaluated by an internal committee.

5.4 Self Study course:

Four Periods per week (which includes library, e-learning, Internet and presentation) are allotted for this course. Self Study shall be evaluated for 75 Marks. Out of 75 Marks, 25 marks for day-to-day evaluation and 50 marks on the basis of end examination conducted by internal committee consisting of Head of the Department, Two Senior faculty Members of the department concerned. There shall be no external examination for self-study.

5.5 Audit Course:

Audit course is one among the compulsory courses and does not carry any credits. The audit courses will start from the II year I- semester onwards. The list of audit courses are shown below:

i) Professional Ethics and Morals

ii) IPR & Patents
5.6 Employability Skills:
Employability skills shall be evaluated for 75 marks. 25 marks for day-to-day evaluation and 50 marks on the basis of end (internal) examination. There is no external examination for employability skills.

5.7 Internship:
All the students shall undergo the internship period of 4 weeks and the students have an option of choosing their own industry which may be related to their respective branch. A self study report for the internship shall be submitted and evaluated during the IV year II-Semester and will be evaluated for a total of 75 marks consists of 25 marks for internal assessment and 50 marks for end examination.

Internal assessment for 25 marks shall be done by the internship supervisor. Semester end examination for 50 marks shall be conducted by committee consists of Head of the Department, internal supervisor and an external examiner.

6. Attendance Requirements:
(i) A student shall be eligible to appear for End Semester examinations, if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects.
(ii) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester with genuine reasons and shall be approved by a committee duly appointed by the college. The condonation approved otherwise it can be reviewed by the College academic committee.
(iii) A Student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. They may seek re-admission for that semester when offered next.
(iv) Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
(v) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
(vi) A fee stipulated by the college shall be payable towards condonation of shortage of attendance.

7. Minimum Academic Requirements:
7.1 Conditions for pass and award of credits for a course:
A candidate shall be declared to have passed in individual course if he/she secures a minimum of 40% aggregate marks (Internal & Semester end examination marks put together), subject to a minimum of 35% marks in semester end examination.

a) On passing a course of a programme, the student shall earn assigned credits in that Course.

7.2 Method of Awarding Letter Grades and Grade Points for a Course:
A letter grade and grade points will be awarded to a student in each course based on his/her performance as per the grading system given below.
Table: Grading System for B.Tech. Programme

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade Points</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-100%</td>
<td>10</td>
<td>S</td>
</tr>
<tr>
<td>80-89%</td>
<td>9</td>
<td>A</td>
</tr>
<tr>
<td>70-79%</td>
<td>8</td>
<td>B</td>
</tr>
<tr>
<td>60-69%</td>
<td>7</td>
<td>C</td>
</tr>
<tr>
<td>50-59%</td>
<td>6</td>
<td>D</td>
</tr>
<tr>
<td>40-49%</td>
<td>5</td>
<td>E</td>
</tr>
<tr>
<td>&lt; 40%</td>
<td>0</td>
<td>F (Fail)</td>
</tr>
</tbody>
</table>

7.3 Calculation of Semester Grade Points Average (SGPA)* for semester:
The performance of each student at the end of the each semester is indicated in terms of SGPA. The SGPA is calculated as below:

\[
SGPA = \frac{\Sigma CR \times GP}{\Sigma CR} \quad \text{(for all courses passed in semester)}
\]

Where CR = Credits of a Course
GP = Grade points awarded for a course

*SGPA is calculated for the candidates who passed all the courses in that semester.

7.4 Calculation of Cumulative Grade Points Average (CGPA) and Award of Division for Entire Programme:
The CGPA is calculated as below:

\[
CGPA = \frac{\Sigma (CR \times GP)}{\Sigma CR} \quad \text{(For entire programme)}
\]

Where CR = Credits of a course
GP = Grade points awarded for a course

Table: Award of Divisions

<table>
<thead>
<tr>
<th>CGPA</th>
<th>DIVISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 8</td>
<td>First Class with distinction</td>
</tr>
<tr>
<td>≥ 7 - &lt; 8</td>
<td>First Class</td>
</tr>
<tr>
<td>≥ 6 - &lt; 7</td>
<td>Second Class</td>
</tr>
<tr>
<td>≥ 5 - &lt; 6</td>
<td>Pass Class</td>
</tr>
<tr>
<td>&lt; 5</td>
<td>Fail</td>
</tr>
</tbody>
</table>
7.5 Supplementary Examinations:
Supplementary examinations will be conducted in every semester.

7.6 Conditions for Promotion:
(i) A student will be promoted to second year, if he/she put up the minimum attendance requirement.
(ii) A student shall be promoted from II to III year only if he fulfills the academic requirement of total 40% credits (if number credits is in fraction, it will be rounded off to lower digit) from regular and supplementary examinations of I year and II year examinations, irrespective of whether the candidate takes the examination or not.
(iii) A student shall be promoted from III year to IV year only if he fulfills the academic requirements of total 40% credits (if number of credits is in fraction, it will be rounded off to lower digit) from regular and supplementary examinations of I Year, II Year and III Year examinations, irrespective of whether the candidate takes the examinations or not.
(iv) A student shall register and put up minimum attendance in all 180 credits and earn all 180 credits, marks obtained in 180 credits shall be considered for the calculation of percentage of marks.

8. Course pattern:
(i) The entire course of study is of four academic years and each year will have TWO Semesters (Total EIGHT Semesters).
(ii) A student is eligible to appear for the end examination in a subject, but absent for it or failed in the end examinations may appear for that subject’s supplementary examinations, when 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 fulfillment of academic regulations. Whereas the academic regulations hold good with the regulations he/she first admitted.

9. Minimum Instruction Days:
The minimum instruction days for each semester shall be 95 clear instruction days.

10. There shall be no branch transfer after the completion of admission process.
11. General:
(i) Where the words “he” “him” “his”, occur in the regulations, they include “she”, “her”, “hers”.
(ii) The academic regulation should be read as a whole for the purpose of any interpretation.
(iii) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the principal is final.
(iv) The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.
ACADEMIC REGULATIONS 2014 FOR B. TECH. (LATERAL ENTRY SCHEME)
(Effective for the students getting admitted into II year from the Academic Year 2014-2015 and onwards)

1. Award of B. Tech. Degree:

A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfill the following academic regulations.
   a) Pursued a course of study for not less than three academic years and not more than six academic years.
   b) Registered for 131 credits and must secure 131 credits.

2. Students, who fail to complete their three year Course of study within six years or fail to acquire the 131 Credits for the award of the degree within 6 academic years from the year of their admission, shall forfeit their seat in B. Tech course and their admission shall stand cancelled.

3. Promotion Rule:

   (a) A lateral entry student will be promoted to II year to III year if he puts up the minimum required attendance in II year.

   (b) A student shall be promoted from III year to IV year only if he fulfills the academic requirements of total 40% of credits (if number of credits is in fraction, it will be rounded off to lower digit) from the II Year and III Year examinations, whether the candidate takes the examinations or not.

4. Minimum Academic Requirements:

4.1 Conditions for pass and award of credits for a course:
   a) A candidate shall be declared to have passed in individual course if he/she secures a minimum of 40% aggregate marks (Internal & Semester end examination marks put together), subject to a minimum of 35% marks in semester end examination.
   b) On passing a course of a programme, the student shall earn assigned credits in that Course.

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Where
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</tr>
<tr>
<td>&lt; 5</td>
<td>Fail</td>
</tr>
</tbody>
</table>

5. All other regulations as applicable for B. Tech. Four- year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)
## 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>1 (a) If the student 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 student 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>2 If the student has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.</td>
</tr>
</tbody>
</table>

- **1 (a)**
  - Expulsion from the examination hall and cancellation of the performance in that subject only.

- **2**
  - Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.
<table>
<thead>
<tr>
<th></th>
<th>If the student impersonates any other student in connection with the examination.</th>
<th>The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, 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 student is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the student 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.</th>
</tr>
</thead>
</table>
| 4 | If the student smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student 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 student is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the student is subject to the academic
<table>
<thead>
<tr>
<th></th>
<th>regulations in connection with forfeiture of seat.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>If the student 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>
</tr>
<tr>
<td>6</td>
<td>If the student 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 or any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty</td>
</tr>
<tr>
<td></td>
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<tr>
<td>---</td>
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</tr>
<tr>
<td>amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</td>
<td>7</td>
</tr>
<tr>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student 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 student 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>8</td>
</tr>
<tr>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student 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 student is also debarred and forfeits the seat.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<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>
</tr>
<tr>
<td>10</td>
<td>If the student comes in a drunken condition to the examination hall.</td>
</tr>
<tr>
<td>11</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
</tr>
</tbody>
</table>
## I - B.Tech

### I - SEMESTER

<table>
<thead>
<tr>
<th>S. No</th>
<th>Sub. Code</th>
<th>Subject</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
<th>INT</th>
<th>EXT</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>13HS1001</td>
<td>English-I</td>
<td>3</td>
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<td>3</td>
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<tr>
<td>02</td>
<td>13HS1003</td>
<td>Environmental Studies</td>
<td>3</td>
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<tr>
<td>03</td>
<td>13BS1001</td>
<td>Engineering Mathematics-I</td>
<td>3</td>
<td>1</td>
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<tr>
<td>04</td>
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<td>06</td>
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<td>Engineering Mechanics</td>
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<tr>
<td>07</td>
<td>13BS1102</td>
<td>Engineering Chemistry Lab</td>
<td>-</td>
<td>-</td>
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<td>3</td>
<td>25</td>
<td>50</td>
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<tr>
<td>08</td>
<td>13EE1101</td>
<td>Basic Electrical Engineering</td>
<td>-</td>
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<td></td>
<td></td>
<td>Lab</td>
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</tr>
<tr>
<td>09</td>
<td>13CS1103</td>
<td>Information Technology</td>
<td>-</td>
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<tr>
<td></td>
<td></td>
<td>Workshop Lab</td>
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<tr>
<td></td>
<td></td>
<td><strong>TOTAL PERIODS/TOTAL CREDITS</strong></td>
<td>33</td>
<td>24</td>
<td>825</td>
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<td></td>
</tr>
</tbody>
</table>

## II - B.Tech

### II - SEMESTER

<table>
<thead>
<tr>
<th>S. No</th>
<th>Sub. Code</th>
<th>Subject</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
<th>INT</th>
<th>EXT</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>13HS1002</td>
<td>English-II</td>
<td>2</td>
<td>1</td>
<td>-</td>
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<td>70</td>
</tr>
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<td>13EE4204</td>
<td>Project Work</td>
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ENGLISH - I  
(Common for all Branches)

Subject Code: 13HS1001  
Credits: 03

Internal Marks: 30  
External Marks: 70

Course Objectives:

- To improve the language proficiency of a technical under-graduate in English with emphasis on LSRW skills.
- To provide learning environment to practice listening, speaking, reading and writing skills.
- To assist the students to carry on the tasks and activities through guided instructions and materials.
- To effectively integrate English language learning with employability skills and training.
- To provide hands-on experience through case-studies, mini-projects, group and individual presentations.
- To expose the students to a variety of self-instructional modes of language learning.
- To develop learner autonomy.

Course Outcomes:

CO 1. Students do improve language proficiency in English.
CO 2. Students will hone the LSRW skills within and beyond the classroom environment.
CO 3. Students can integrate English Language Learning with employability skills.
CO 4. Students can inculcate the habit of speaking in English fluently with observation and practice.

UNIT I:

Lost Forests by Johannes V Jensen
Reading – Vocabulary – Essential Grammar – Writing – Classroom activities.

UNIT II:

More than 100 million women missing by Amartya Sen
Reading – Vocabulary – Essential Grammar – Writing – Classroom activities.

UNIT III:

Three Days to See – Helen Keller
Reading – Vocabulary – Essential Grammar – Writing – Classroom activities.
UNIT IV:
Reaching for the Stars – Kalpana Chawla
Reading – Vocabulary – Essential Grammar – Writing – Classroom activities.

UNIT V:
Kalahandi by Jagannath Prasad Das
Reading – Vocabulary – Essential Grammar – Writing – Classroom activities.

TEXT BOOKS:

REFERENCE BOOKS:
1. My Story by Helen Keller
2. Kalpana Chawla: A Life – Padmanabhan, Anil
3. Word Power Made Easy – Norman Lewis
ENVIRONMENTAL STUDIES
(Common to all branches)

Subject Code: 13HS1003  Internal Marks: 30
Credits: 3  External Marks: 70

Course Objectives:

• Human development and societal development is inevitable. This development is entirely depends on science and Technological advancement through using resource assets of nature. In order to reduce the impacts of the technological development, the environmental studies creating awareness among the engineering graduates. So that we can have a healthy environment Present and future.

• The course covers the aspects like general awareness, Resources” utilization and conservation, Healthy sustenance of life, pollution control, social aspects, etc. All these areas will provide and habituate the students to- wards conservation and sustainable development.

Course Outcomes:

CO 1. The knowledge about environmental studies is applicable as and when required like implementing any developmental activity can overcome the hurdles” in relation to environmental aspects.

CO 2. Students can develop eco-friendly technologies for a healthy growth, and development of a nation which can prevent the environmental hazards by appropriate decisions and alternate remedies.

CO 3. Can develop life cycle analysis, give bioremediation methods etc. rather than unsustainable alternatives.

UNIT I:

Natural Resources: Resources classification – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Water resources – Use and over utilization of surface and ground water– Floods, drought, conflicts over water, dams– benefits and problems on Tribal population & Environment - Mineral resources: Use and exploitation, Tribal & 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 – concept of sustainable agricultural methods, case studies. – Energy resources: Growing energy needs, non-renewable energy sources - coal, crude oil, natural gas - use of renewable and alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.
UNIT II:
Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. Food chains, food webs and ecological pyramids. - Energy flow and nutrient flow in the ecosystems - Ecological succession - Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (lakes, rivers, oceans, estuaries)


UNIT III:

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, Industrial and bio-medical wastes. - Pollution case studies. Role of individual in prevention of pollution - Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV:

UNIT V:

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. -Study of simple ecosystems pond, river, hill slopes, etc.

TEXT BOOKS:

REFERENCE BOOKS:
ENGINEERING MATHEMATICS-I
(Common to All Branches)

Subject Code: 13BS1001  
External Marks: 70
Credits: 3  
Internal Marks: 30

Course Objectives:

- To identify & solve the 1st order differential equations and apply in Engineering.
- To understand the process of solving a 2nd and higher order differential equation and solve it. Identify a 2nd and higher order differential equation & solve it in engineering topics.
- Understand the mathematical and physical interpretation of Vector differential operator operating on a vector or scalar point function, the line, surface and volume integrals, vector integral theorems and their applications to find work done, area, and volume.
- To understand the generalized mean value theorems & their use to find the series expansions of functions and in turn their application in finding the maxima and minima of two variable functions.
- Apply the properties of curves in applications of single integral, solve the multiple integrals and to develop the capacity to understand the applications of multiple integrals.

Course Outcomes:

CO 1. Able to solve the 1st order differential equations in different fields.
CO 2. Identify and solve a 2nd and higher order differential equations and perform simple applications in Engineering.
CO 3. Calculate grad, divergence, curl; a line, surface and volume integral. To find work done, area, and volume. Apply the vector integral theorems to evaluate multiple integrals.
CO 4. Find the maxima and minima of two variable functions under different constraints.
CO 5. Solve the single and multiple integrals and calculate the moment of inertia.

UNIT I:

Linear Differential Equations of first order: Linear differential equations of first order and first degree – exact, linear and Bernoulli.

UNIT II:
**Linear Differential Equations of Second and higher order:** Linear differential equations of second and higher order with constant coefficients- Complete solution, Operator D, Rules for finding complementary function, Inverse operator D, Rules for finding particular integral 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.
Applications: LCR circuit, Simple Harmonic motion

UNIT III:
**Partial Differentiation**: Introduction-Total derivative - Chain rule - Generalized Mean Value theorem for single variable (without proof)-Taylors and Mc Laurent’s series for two variables – Functional dependence– Jacobian.
Application: Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT IV:
**Multiple Integrals**: Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates. Multiple integrals - double and triple integrals – change of variables – Change of order of Integration-Cartesian and Polar coordinates.
Application: Moment of inertia

UNIT V:
**Vector Calculus**: Vector Differentiation-Gradient- Divergence- Curl - Laplacian and second order operators- Vector identities.
Applications: Work done, Force

TEXT BOOKS:

REFERENCE BOOKS:
ENGINEERING CHEMISTRY
((Common to All Branches)

Sub. Code: 13BS1005
Credits: 3

Course Objectives:

- Acquired sufficient information to ensure that they have an appreciation of polymer science and the typical role of the polymer scientist in today’s society.
- Learned about what is meant by corrosion of metals including different forms of metal degradation and the application of preventative procedures.
- Understand the principles of toxicology, the molecular mechanisms of how chemicals affect human health and the environment, and the resources to identify and assess molecular hazards.
- Novel technology materials are almost prepared from rubber material which is very useful by learning it in this modern civilization.
- Learned about the many scientific, ethical, social and political issues arising from the development of nanotechnology.
- Understand societal impact and managing possible risks of nanotechnology: present and future.
- Understand basic interdisciplinary nature of nanotechnology; (physics, chemistry, electronic and mechanical properties, bio-nanotechnology).
- Evaluate the effectiveness of various types of management practices related to treatment of drinking water and treatment and disposal of related wastewater.
- Describe the current alternative fuels in use today and the science involved in developing alternate fuels.

Course Outcomes:

CO 1. Students will understand the basic language of polymer chemistry, and the synthetic techniques by which polymers can be prepared.
CO 2. They will be expected to conceptualize polymer synthetic schemes, to analyze synthesis problems and to create theoretical solutions to the basic challenges of polymer synthesis.
CO 3. Students to become better informed about the many scientific, ethical, social and political issues arising from the development of nanotechnology.
CO 4. The student should be able to explain the tendency of metals to revert back to their ores in order to attain a lower energy state.
CO 5. Can able to explain what is meant by corrosion of metals including different forms of preventative procedures.
CO 6. Possess the ability to assess chemical products and processes and design greener alternatives when appropriate.
CO 7. Distinguish, classify and summarize automotive systems, functions and their interrelation.
CO 8. Student should be able to explain the mode by which potable water is produced through the processes of screening, micro straining, aeration, coagulation and flocculation, sedimentation, flotation, filtration and disinfection;
UNIT-I:
**Polymers:** Polymerization reactions – Basic concepts, types of polymerisation – addition and condensation polymerisations, plastics – thermosetting and thermoplastics– differences. Compounding and Moulding of plastics– Compression, injection, transfer and extrusion moulding methods. Preparation, properties and engineering uses of the following: PE, PVC, Teflon, Bakelite, Nylon, Polyesters.

**Building Materials:** Cement–Classification; Portland cement–raw materials, manufacture of Portland cement, chemical constitution of Portland cement, Setting and Hardening of Portland Cement.

UNIT-II:

UNIT-III:
**Science Of Corrosion:** Definition, examples, Types of corrosion: Theories of corrosion and Mechanism– Dry corrosion (Direct chemical attack), Wet corrosion (Electrochemical theory) Principles of corrosion, Galvanic series, Galvanic corrosion, Concentration cell corrosion, mechanism of wet corrosion – Hydrogen evolution type, oxygen absorption type. Factors influencing corrosion control of corrosion – proper design, use of pure metal and metal alloys, passivity, cathodic protection – Sacrificial anode and impressed current. Modifying the environment, use of inhibitors.

UNIT-IV:
**Fuel Technology:** Introduction to Liquid Fuels-Classification of Crude Oil-Fractional Distillation-Cracking (Thermal &Catalytic), Synthetic Petrol (Fischer-Tropschs & Bergius Process) - Polymerization-Refining &Reforming –Knocking –Anti Knocking Agents-Octane & Cetane Number.

**Lubricants:** Principle and functions of lubricants – Types of lubrication and mechanism – Thick film or Hydrodynamic lubrication, Thin film lubrication, extreme pressure lubrication. Classification and properties of lubricants – Viscosity, flash and fire points, cloud and pour points, aniline points, neutralization number and mechanical strength.
UNIT-V:


**Green Chemistry:** Introduction-12 principles of green chemistry – green synthesis - Engineering Applications

**Nano Chemistry:** Introduction to Nano materials-preparation of few Nano materials (Carbon Nano Tubes, Fullerenes etc)- Top down and Bottom up concepts - Properties of Nano materials- Silver and Gold Nano particles - Engineering & Biomedical applications.

**TEXT BOOKS:**


**REFERENCE BOOKS:**

FUNDAMENTALS OF ELECTRICAL ENGINEERING

Sub. Code: 13EE1001  Credit: 3  
Internal Marks: 30  External Marks: 70

Course Objective:
- A fundamental of Electrical Engineering is a basic course for the discipline of EEE. The aim of the course is to teach the basic fundamentals of electrical engineering, so that the students will have to understand the topics related to electrical applications in the later studies.

Course Outcomes:
At the end of this subject the student will be able to understand

1. Basic definitions of electrical engineering.
2. Types of elements.
4. Phase.
5. Capacitors and inductors and their series & parallel operation.
6. Study state response of A.C circuits with different elements
7. Basic definitions of magnetic circuits.
8. Comparison between magnetic and electrical circuit
10. Different types of main switches.
11. Electrical wiring system

UNIT-I:
Introduction to Electrical Circuits: Circuit concepts –Resistor(R)-Inductor(L)-Capacitor(C)-Voltage and Current Sources (Ideal and Non-Ideal)- Independent and Dependent Sources-Source transformation-Voltage - Current relationship for passive bilateral elements (for different input signals-square, ramp, saw tooth, triangular)-Ohm”s law, Kirchoff”s laws

UNIT-II:
UNIT-III:
**Magnetic circuits:** Basic definitions of magnetic flux, flux density, Reluctance, Magneto motive force (m.m.f), magnetic field intensity, magnetic permeability and susceptibility. Comparison between magnetic and electrical circuits, inductively coupled circuits – coefficient of coupling – dot convention – multi – winding coupled circuit – analysis of coupled circuit.composite magnetic circuit-analysis of series and parallel magnetic circuits, simple problems on magnetic circuits.

UNIT-IV:
**Measuring instruments:** Basic Principle of indicating instruments, types of instruments, operation of permanent magnet moving coil and moving iron instruments.

UNIT-V:
**Electrical Wiring:** Electrical Wiring accessories switches, ceiling roses, lamp holders and adopters, sockets, plug, fuses.

Study different types of main switches (DP mains, ICDP, ICTP) and MCB,s. Basics in wiring system, estimation of cost selection of interior wiring system suitable to a given building - number of circuits. Drawing wiring layout for a living room.

TEXT BOOKS:
1. Electrical Circuits by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill.
2. Engineering network analysis and filter design by Gopal G. Bhise, Umesh Publications.

REFERENCE BOOKS:
2. Electrical wiring by Arora
3. Electrical Drawing by Balbir Singh.
ENGINEERING MECHANICS
(Common for Civil, EEE, ECE, CSE & IT branches)

Subject Code: 13ME1003
Credits: 3
Internal Marks: 30
External Marks: 70

Course Objectives:

- To provide knowledge on system of forces, free body diagram.
- To provide knowledge on friction between two matting surfaces.
- To provide knowledge on centre of gravity and moment of inertia for different sections.

Course Outcomes:

CO 1. Able to know system of forces, free body diagram
CO 2. Able to know the friction between two matting surfaces
CO 3. Able to calculate centre of gravity and moment of inertia for different sections.

UNIT- I:


UNIT –II:


UNIT- III:


Centroids And Center Of Gravity: Centre of gravity–centroids of area and lines–determination of centroids by integration – centroids of composite figures – theorems of Pappus.
UNIT- IV:


**Mass Moment Of Inertia**: Moment of inertia of masses–Radius of gyration–Transfer formula for massmoment of inertia – Mass moment of Inertia by Integration.

UNIT -V:


**Kinetics**: Kinetics of rigid bodies–equation of planes motion–fixed axis rotation–rolling bodies (simple examples)- general plane motion (Simple examples).

**TEXT BOOKS**:


**REFERENCES**:

ENGINEERING CHEMISTRY LAB
(Common to All Branches)

Subject Code: 13BS1102
Credits: 2

Course Objectives:
The students completing this course are expected to understand:

- Determination of hardness, D.O., Turbidity of water.
- Determination of viscosity, flash point and acid value of oil.
- Determination of concentration of a solution pH metrically and conductometrically.
- Synthesis of polymers and preparation of compounds.

Course Outcomes:
The students are expected to:

CO 1. Understand the importance of viscosity of a lubricant.
CO 2. Be able to select a lubricant for a particular type of a machine.
CO 3. Analyze the importance of temperature for viscosity.
CO 4. Know the impurities with hardness experiment.
CO 5. Correlate the purity of water by doing D.O., Turbidity experiments.
CO 6. Suggest the composition of water to be fed to boilers and households.
CO 7. Know to maintain different reaction conditions to get maximum yield.

LIST OF EXPERIMENTS:
(Any Twelve experiments have to be completed)

1. Determine the Acid Value present in the given lubricating oil.
2. Determine the Flash and Fire points of given Oil Sample.
3. Determine the Kinematic Viscosity of a given oil sample by using Viscometer.
4. Estimate the amount of Dissolved Oxygen present in the given water sample by Modern Winkler’s Method.
5. Determine the Total Hardness present in the given water sample by using EDTA Method.
6. Estimate the amount of Turbidity present in the given water sample by using Turbidity meter.
7. Estimate the Viscosity of an Organic Solvent by using Ostwald Viscometer.
9. pH metric Titrations between Strong acid and Strong base.
10. pH metric Titrations between Strong acid and Weak base.
11. Conductometric Titrations between Strong acid and strong base.
12. Conductometric Titrations between Strong acid and Weak base.
14. Estimate the amount of Calcium present in given cement sample.

TEXT BOOKS:

REFERENCES:
BASIC ELECTRICAL ENGINEERING LAB

Subject code : 13EE1101
Credits: 2

Internal Marks: 25
External Marks: 50

Course Objective:

- To introduce the student to study different electrical components and to verify the basic laws related to electrical engineering, electrical wiring system through study, practice, and experiments.

Course Outcomes:

At the end of this lab the student will be able to

CO 1. Understand various types of electrical components.
CO 2. Understand various basic laws related to electrical engineering.
CO 3. Understand electrical wiring system.
CO 4. Understand control of lamps.
CO 5. Understand soldering and bread board precautions.

LIST OF EXPERIMENTS:

1. Study of electrical components.
2. To verify Ohm’s law
   To verify (a) Kirchhoff’s current law (b) Kirchhoff’s voltage law
3. To verify the total resistance of the series and parallel connected circuits.
4. To find voltage current relationship for series RL circuit and determine power factor.
5. Determination of peak and average voltage in A.C circuit.
7. Fluorescent tube connection.
8. (a) One way control of lamp
    (b) Two way control of lamp
10. Living room wiring.

ADDITIONAL EXPERIMENTS:
11. Soldering and bread board precautions.
12. Parameters of a choke coil.
INFORMATION TECHNOLOGY WORKSHOP LAB
(Common to All Branches)

Subject Code: 13CS1103
Credits: 2
Internal Marks: 25
External Marks: 50

Course Objectives:
- The IT Workshop for engineers is a 6 training lab course spread over 60 hours. 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.
- Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, 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 spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools.

Course Outcomes:
- **CO 1.** Students gain knowledge on computer system such as system unit, input devices, output devices connected to the computer.
- **CO 2.** Students gain knowledge to understand the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.
- **CO 3.** Students gain knowledge to understand the working of the internet that include the use of protocols, domains, IP addresses, URLs, web browsers, web servers, mail-servers, etc.
- **CO 4.** Students get familiarize with parts of Word window, To create and save a document, To set page settings, create headers and footers, To use various formatting features such as bold face, italicize, underline, subscript, superscript, line spacing, etc.
- **CO 5.** Students get familiarize with parts of Excel window, To create and save a workbook with single and/or multiple worksheets, To apply operations on range of cells using built-in formulae, etc.
CO 6. Students get familiarize with parts of PowerPoint win, to create and save a new presentation, apply design templates to a presentation, to insert, edit and delete a slide, etc.

CO 7. Students gain knowledge on search information using search engines etc.

**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. 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 would be given as part of the course content.

**Week 2 –Task 2:** 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 3 –Task 3:** 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. Several mini tasks would be that covers Basic commands in Linux and Basic system administration in Linux which includes: Basic Linux commands in bash, Create hard and symbolic links, Text processing, Using wildcards

**Week 4 – Task 4:** Hardware Trouble shooting: 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.

Software Trouble shooting: 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.
Internet & World Wide Web

Week 5 - 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.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Week 6 - Task 3: 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 to the instructors.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

Word:

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

Task 1: Using 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 Word.

Week 8 - Task 2: Creating project abstract Features to be covered:- Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.
**Task 3:** Creating a Newsletter: Features to be covered:
- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs

**Week 9-Task 4:** Creating a Feedback form - Features to be covered: Forms, Text Fields, Inserting objects, Mail Merge in Word.

**Excel**

**Week 10 - Excel Orientation:** The mentor needs to tell the importance of MS/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

**Week 11 - Task 2:** Calculating GPA - Features to be covered:
- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP / VLOOKUP

**Task 3:** Performance Analysis - Features to be covered:
- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

**Week 12-Task 4:** Cricket Score Card - Features to be covered:
- Pivot Tables, Interactive Buttons, Importing Data, Data Protection, Data Validation

**MS/equivalent (FOSS) tool Power Point**

**Week 13 - 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 week includes:

**Week 14 - Task 2:** Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts, Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.
**Week 15 - Task 3:** Entire week concentrates on presentation part of power point. Topic covered during this week includes - Using Auto content wizard, Slide Transition, Custom Animation, Auto Rehearsing.

**Publisher**

**Week 16:** Help students in preparing their personal website using Microsoft/ equivalent (FOSS) tool publisher. Topic covered during this week includes - Publisher Orientation, Using Templates, Layouts, Inserting text objects, Editing text objects, Inserting Tables, Working with menu objects, Inserting pages, Hyper linking, Renaming, deleting, modifying pages, Hosting website.

**TEXT BOOKS:**

1. “Comdex Information Technology course tool kit” : Vikas Gupta, WILEY Dreamtech
3. “Introduction to Information Technology”, ITL Education Solutions limited, Pearson Education.
4. “PC Hardware and A+ Handbook” – Kate J. Chase PHI (Microsoft)
5. All others related material is available at  
   (a) www.sssolutions.in  
   (b) www.sontisoftsolutions.org
ENGLISH – II
(Common for all Branches)

Subject Code: 13HS1002  External Marks: 70
Credits: 02  Internal Marks: 30

Course Objectives:

- To improve the language proficiency of a technical under-graduate in English with emphasis on LSRW skills.
- To provide learning environment to practice listening, speaking, reading and writing skills.
- To assist the students to carry on the tasks and activities through guided instructions and materials.
- To effectively integrate English language learning with employability skills and training.
- To provide hands-on experience through case-studies, mini-projects, group and individual presentations.
- To expose the students to a variety of self-instructional modes of language learning.
- To develop learner autonomy.

Course Outcomes:

CO 1. Students do improve language proficiency in English.
CO 2. Students will hone the LSRW skills within and beyond the classroom environment.
CO 3. Students can integrate English Language Learning with employability skills.
CO 4. Students can inculcate the habit of speaking in English fluently with observation and practice.

UNIT –I:

Globalization by Joseph Stiglitz
Reading – Vocabulary – Essential Grammar – Writing – Classroom activities.

UNIT - II:

My Early Days by Dr. A. P. J. Abdul Kalam
Reading – Vocabulary – Essential Grammar – Writing – Classroom activities.

UNIT -III:

I have a Dream by Martin Luther King
Reading – Vocabulary – Essential Grammar – Writing – Classroom activities.
UNIT -IV:

The Cop and the Anthem by O. Henry
Reading – Vocabulary – Essential Grammar – Writing – Classroom activities.

UNIT -V:
Telephone Conversation by Wole Soyinka
Reading – Vocabulary – Essential Grammar – Writing – Classroom activities.

REFERENCES:

2. Wings of Fire – APJ Abdul Kalam
3. Short Stories – O. Henry
4. 30 days to a more Powerful Vocabulary by Norman Lewis and Wilfred Funk.
COMPUTER PROGRAMMING
(Common to All Branches)

Subject Code: 13CS1001  Internal Marks: 30
Credits: 3  External Marks: 70

Course Objectives:

- Gain a working knowledge of C programming.
- Learn how to write modules, efficient and readable program.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.
- To teach the issues in file organization and the usage of file systems.
- To impart the knowledge about pointers which is the backbone of effective memory handling.
- To study the advantages of user defined data type which provides flexibility for application development.
- To teach the basics of preprocessors available with C compiler.

Course Outcomes:

CO 1. Understand the basic terminology use in C program.

CO 2. To develop programs using the basic elements like control statements, Arrays and Strings.

CO 3. To solve the memory access problems by using pointers.

CO 4. To understand about the dynamic memory allocation using pointers which is essential for utilizing memory.

CO 5. Use different data types in a computer programming.

CO 6. To develop advanced applications using enumerated data types, function pointers and nested structures.

CO 7. To learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.

CO 8. To implement the concepts in data structure like linked lists.

CO 9. To understand the uses of preprocessors and various header file directives.
UNIT I:
C Fundamentals, Character set, C tokens (Identifier and Keywords, Data types, Constants, variables), Declararions, Expressions, Statements

UNIT II:
Control Structures: if statement, if…else statement-various forms of if, nested if.
Iterative Loops: while, do-while and for statements, initialization and updating, event and counter controlled loops,looping applications, break statement, continue statement, goto statement, switch statement, nested switch statement, comma statement.

UNIT III:
Functions – Modular Programming: Functions, basics, parameter passing, Storage classes- extern, auto, register,static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions, header files, example c programs. Passing 1-D arrays, 2-D arrays to functions, parameter passing mechanisms (passing by value), storage classes (auto, register, extern, static), scope of variable
Arrays: Arrays - concepts, declaration, definition, accessing elements, storing elements, Strings concepts, Stringhandling functions and string manipulations, 1-D arrays, 2-D arrays and character arrays, Multidimensional arrays, Array applications: Matrix Operations

UNIT IV:
Pointers: Pointer definition, pointers concepts, initialization of pointer variables, pointers and function arguments, passing by address, dangling memory, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimentional arrays, dynamic memory management functions, command line arguments.
Enumerated, Structure And Union Types: Derived types- structures- declaration, definition and initialization ofstructures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications.
UNIT V:
**File Handling:** Input and output–concept of a file, Creating, processing, opening and closing–Bitwise Operations, text files and binary files, Formatted I/o, file I/o operations, example programs. C pre-processor

**TEXT BOOKS:**

**REFERENCE BOOKS:**
ENGINEERING MATHEMATICS – II
(Common to all branches)

Subject Code: 13BS1002  Internal Marks: 30
Credits: 3  External Marks: 70

Course Objectives:
- Identify, formulate, and solve the algebraic and transcendental equations. Solve the problems under curve fitting.
- To identify and solve Laplace and Inverse Laplace transforms of different functions, apply the knowledge of its properties in Engineering.
- Approximate an unknown function \( y = f(x) \) tabulated at evenly or unevenly spaced points by a polynomial. Develop the capacity to find the numerical solution of an ordinary differential equation and evaluate definite integrals.
- Solve linear and non-linear 1\textsuperscript{st} order partial differential equations. Solve the wave, heat and Laplace equations by the method of separation of variables.

Course Outcomes:
CO 1. Solve the algebraic and transcendental equations by different numerical methods. Approximate a linear and non-linear equation to the given data by the method of least squares.
CO 2. Apply the knowledge of Laplace transforms formulae in solving ordinary differential equations & also in engineering field.
CO 3. Find an unknown function \( y = f(x) \) for an evenly or unevenly spaced points by a polynomial. Find the numerical solution of an ordinary differential equation and evaluate definite integrals.
CO 4. Solve a linear and non-linear 1\textsuperscript{st} order partial differential equation. Solve a linear second and higher order partial differential equation by the method of separation of variables and apply it to solve the wave, heat and Laplace equations.

UNIT -I:
Curve fitting: Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares.

UNIT-II:
Interpolation and Numerical Differentiation and Integration:
UNIT-III:

UNIT-IV:
**Laplace and Inverse Laplace transforms:** Laplace transforms of standard functions – Shifting Theorems, Transforms of derivatives and integrals – Unit step function – Dirac’s delta function – Inverse Laplace transforms – Convolution theorem.
**Application:** Solution of ordinary differential equations using Laplace transforms.

UNIT-V:
**Applications:** One dimensional Wave and Heat equations.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
ENGINEERING MATHEMATICS – III
(Common to All Branches)

Subject Code: 13BS1003  Internal Marks: 30
Credits: 3  External Marks: 70

Course Objectives:
- Calculate the rank of a matrix, solve linear system of equations by different methods and apply the knowledge to find the current in an electric circuit.
- Understand the concept of eigen values, eigen vectors, Cayley’s Hamilton theorem and its applications. Also to acquire the knowledge of reduction of quadratic to canonical form and its applications.
- Acquire the knowledge of Fourier & Inverse Fourier transforms, their properties, and solving problems.
- Perform the Fourier series expansion of different functions in different intervals. Also to acquire the knowledge of half range series.
- Acquire the knowledge of z-transforms and inverse z-transforms, their properties and their applications to solve difference equations.
- Study the Beta and Gamma functions, their properties and their applications to solve improper integrals.

Course Outcomes:
CO 1. Calculate the rank of a matrix, solve a linear system of equations and apply the knowledge in the engineering field.
CO 2. Calculate the eigen values, eigen vectors, use Cayley’s Hamilton theorem to calculate inverse and powers of a matrix. Reduce a quadratic form to canonical form and find its nature.
CO 3. Calculate the z-transforms and inverse z-transforms of different functions and to solve the difference equations.
CO 4. Apply Beta and Gamma functions to solve improper integrals.
CO 5. Find the Fourier series and half range series expansion of different functions in different intervals.
CO 6. Find the Fourier & inverse Fourier transforms of different functions and apply this knowledge in solving different engineering problems.

UNIT -I:
Application: Finding the current in a electric circuit.
UNIT -II:
Applications: Free vibration of a two mass system.

UNIT -III:

UNIT -IV:
Application: Solution of Difference equations by Z-transforms.

UNIT- V:
Special functions: Gamma and Beta Functions – Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.
Application: Evaluation of integrals.

TEXT BOOKS:

REFERENCE BOOKS:
3. Dean G. Duffy, Advanced engineering mathematics with MatLab, CRC Press.
ENGINEERING PHYSICS  
(Common to all Branches )

Subject Code: 13BS1004  
Credits: 3

Course Objectives:
- To relate fundamental physics to practical engineering problems
- To get acquainted with a curriculum of interdisciplinary nature
- To understand and appreciate modern physics concepts
- To introduce advanced topics in physics in contemporary context

Course Outcomes:
- CO 1. Explain the modern physics concepts
- CO 2. To correlate advanced topics in physics with engineering applications
- CO 3. To be familiar with basic elements of quantum theory
- CO 4. Get acquainted with current trends in physics

UNIT-I:
Wave Optics:
**Interference:** Introduction, Principle of Superposition of Waves, Coherence – Young’s Double Slit Experiment – Intensity Distribution and Fringe Width, Interference in Plane Parallel Film due to Reflected Light, Newton’s Rings under Reflected Light - Determination of Wavelength of Monochromatic Source of Light.
**Diffraction:** Introduction, Types of Diffraction [Fresnel & Fraunhofer], Fraunhofer Diffraction due to Single Slit – Intensity Distribution Differences between Interference and Diffraction,

UNIT-II:
Lasers & Fiber Optics:
UNIT-III:
Introductory Solid State Physics:
X-Ray Diffraction: Crystal Planes, Directions and Miller Indices, Distance of Separation between successive hkl Planes – Inter Planar Spacing, Diffraction of X-Rays by Crystal Planes – Bragg’s Law;

UNIT-IV:
Essentials of Material Science:
Magnetic Properties: Introduction, Basic Terms – Magnetic Flux (φ), Magnetic Flux Density or Magnetic Field Induction (B), Magnetic Field Intensity or Magnetic Field Strength (H), Intensity of Magnetization (I), Permeabilty (µ) & Relative Permeability (µr) and Susceptibility (χ), Relation between B, H & I, Relation between Relative Permeability and Susceptibility, Origin of Magnetic Moment – Bohr Magneton, Classification of Magnetic Materials – Dia, Para and Ferro, Domain Theory of Ferromagnetism – Hysteresis Curve; Soft and Hard Magnetic Materials.
Dielectric Properties: Introduction, Basic Terms – Electric Field (E), Electric Dipole, Electric Dipole Moment (µe), Polarizability (α), Polarization Vector (P), Displacement Vector (D), Permittivity (ε) and Relative Permittivity or Dielectric Constant (εr), and Electric Susceptibility (χe), Relation between D, E & P, Relation between Relative Permittivity and Susceptibility, Electronic Polarizability, Ionic Polarizability, Orientational Polarizability and Total Polarizability, Definitions of Ferro Electricity and Piezoelectricity

UNIT-V:
Preliminary Quantum Mechanics & Free Electron Theory:
Free Electron Theory: Introduction, Classical Free Electron Theory, Mean free path, Relaxation time, Drift velocity, Mobility, Current Density and Electrical Conductivity.

TEXT BOOKS:
1. Engineering Physics by Mani Naidu, Pearson Publications Chennai
2. A Text Book of Engineering Physics by Ksheera Sager and Avadhanulu

REFERENCES:
2. Fundamental of Physics by Resnick, Halliday and Walker
ENGINEERING DRAWING
(Common to all Branches)

Subject Code: 13ME1001    Internal Marks: 30
Credits: 3                External Marks: 70

Course Objectives:

- Able to develop drawing skills and representation of I angle and III angle projection, isometric Projection, Isometric drawing.

Course Outcomes:

CO 1. An ability to apply knowledge of engineering drawing principles in other subjects in Mechanical Engineering and other Engineering disciplines.
CO 2. Should be able to understand the Machine & Component drawing skill in other semesters.

UNIT-I:
Lettering and Dimensioning: Introduction to various terms; instruments IS 9609 provision, lettering practice. Elements of dimensioning and systems of dimensioning.

Construction of scales: Plain Scale, Diagonal & Vernier Scales.


UNIT- II:
Orthographic Projections: First and Third Angle Projections:
Projections of Points. Projections of Straight Lines inclined to one reference plane.

UNIT -III:
Projections of planes - Perpendicular planes & planes inclined to one reference plane and both reference planes.

UNIT –IV:
Projections of solids: Classification of solids. Projections of Prism, Cylinder, Pyramid & Cone inclined to one reference plane.
UNIT- V:

**Conversion of Orthographic Projections to Isometric Projections**: Conversion of Orthographic View to Isometric views

**Conversion of Isometric Projection to Orthographic Projections**: Conversion of Isometric view to Orthographic views

**TEXT BOOKS**:

2. Engineering Drawing, by K.L.Narayana & P.Kanniah

**REFERENCE BOOKS**:

BASIC ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY (Common for all Branches)

Subject Code: 13HS1101  Internal Marks: 25
Credits: 2  External Marks: 50

Course Objectives:
- To improve the communication skills through Listening & Practicing the structures of language.
- To make the students to adopt themselves to the situations and converse using their spontaneity.
- To make the students acquiring the language proficiency.
- To provide the real life situations to emulate the language properly.
- To make them realize the importance of Stress, Intonation and Rhythm of language.
- To make the students to improve pronunciation, vocabulary, language skills, communication skills, body language and grammar to fulfill the demands of the employer.
- Student will be able to master technical and communicative English language & LSRW skills, both verbal(Oral & Written) & Non-verbal

Course Outcomes:
CO 1. Students do improve language proficiency in English
CO 2. Students will hone the LSRW skills within and beyond the class room environment
CO 3. Students can integrate English language learning with employability skills
CO 4. Students will can inculcate the habit of speaking in English fluently with observation and practice.

LIST OF SESSIONS
UNIT-I: Introduction to Phonetics, Sentences and its applications and listening skills.
UNIT-II: Consonant Sounds, Parts of Speech & Speaking skills.
UNIT-III: Vowel Sounds, Tenses & Writing skills.
Unit-IV: Syllable & Stress, voice & Writing skills.
UNIT-V: Rhythm & Intonation, Reported Speech & Situational Dialogues.

TEXT BOOKS:
2. “Strengthen your Steps” by Dr. M. Hari Prasad, Dr. John Varghese, Dr. R. Kishore Kumar, Maruthi Publications, Hyderabad (2010)

REFERENCES:
COMPUTER PROGRAMMING LAB
(Common to All Branches)

Subject Code: 13CS1101
Credits: 2

Course Objectives:
- To provide the student with the necessary skills to write and debug programs using the C programming language
- To provide coverage of basic structure of C programming language
- To provide an understanding of the major modules of C programming language

Course Outcomes:
On successful completion of this module, students should be able to:

CO 1. Design, implement, test, debug and document program in C
CO 2. When and how to use the appropriate statements available in the C language
CO 3. Explain the principles of structured program design
CO 4. Describe when and how to use the standard C statements
CO 5. Write basic C programs using
CO 6. Selection statements, Repetitive statements, Functions, Pointers, Arrays, Strings

Exercise 1:

a) Write C programs for calculating • Temperature conversions • Income tax 
   • Area of triangle 
b) Write a C program that reads an integer ‘n’ and rotate ‘n’ bit positions 
c) Write a C program to swap contents of two variables without using third variable.

Exercise 2:

a) Write a C program to find the student’s grade for given marks. 
b) Write a C program to find the greatest of 3 given numbers. 
c) Write a C program which takes two integer operands and one operator from the user, 
   perform the operation and then prints the result. (Consider the operators +, -, *, /, % 
   and use Switch Statement)

Exercise 3:

a) Write a C program to find the sum of individual digits of a positive integer. 
b) Write a C program to generate the first ‘n’ terms of the Fibonacci sequence. 
c) Write a C program to generate all the prime numbers between 1 and ‘n’. 
d) Write a C program to find the reverse a given number.
Exercise 4:

a) Write a C program for Addition and multiplication of two Matrices.
b) Write a C program to find the transpose of a matrix in in-place manner.

Exercise 5:

Write a C program that uses functions to perform the following operations:

a) To insert a sub-string in to given main string from a given position.
b) To delete n Characters from a given position in a given string.
c) Simple programming examples to manipulate strings.
d) Verifying a string for its palindrome property

Exercise 6:

Write C programs that use both recursive and non-recursive functions for the following

a) To find the factorial of a given integer.
b) To find the GCD (greatest common divisor) of two given integers.

Exercise 7:

a) Write a C functions to find both the largest and smallest number of an array of integers.
b) Write a C function that uses functions to perform the following:
   i) that displays the position/ index in the string S where the string T begins, or –1 if S doesn’t contain T.
   ii) to count the lines, words and characters in a given text.

Exercise 8:

a) Write a C function to generate Pascal’s triangle.
b) Write a C function to construct a pyramid of numbers.
c) Write a C function to read in two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+\ldots+\ldots+\ldots\ldots+x^n$

Exercise 9:

a) Write a C program Pointer based function to exchange value of two integers using passing by address.
b) Write a C program which explains the use of dynamic arrays.
c) Write a C program to enlighten dangling memory problem (Creating a 2-D array dynamically using pointer to pointers approach.)
Exercise 10:

Write a C programs for Examples which explores the use of structures, union and other user defined variables

Exercise 11:

Write a C program that uses functions to perform the following operations using Structure:

a) Reading a complex number  
b) Writing a complex number  
c) Addition of two complex numbers  
d) Multiplication of two complex numbers

Exercise 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)

REFERENCE BOOKS:

1. C and data structures – Dr. N.B Venkateswarlu, B.S. Publications.  
4. The C – Programming Language” B.W. Kernighan, Dennis M. Ritchie, PHI
ENGINEERING WORKSHOP
(Common to all Branches)

Subject Code: 13ME1101 Internal Marks: 25
Credits: 2 External Marks: 50

Course Objectives:

- The Engineering Workshop Practice for engineers is a training lab course spread over entire year. The modules include training on different trades like Fitting, Carpentry, Black smithy etc… which makes the students to learn how various joints are made using wood and other metal pieces.

Course Outcomes:

CO 1. Student will be able to make various joints in the given object with the available work material.
CO 2. Student will be able to know how much time a joint will take for the assessment of time.

I. Wood Working Technology: Familiarity with different types of woods used and tools used in wood working technology.

Tasks to be performed:

1) To make Half – Lap joint  
2) To make Mortise and Tenon joint  
3) To make Corner Dovetail joint  
4) To make Briddle joint

II. Sheet Metal Working: Familiarity with different types of tools used in sheet metal working, developmentsof sheet metal jobs from GI sheets, knowledge of basic concepts of soldering.

Tasks to be performed:

1) To make Square Tray  
2) To make Taper side Tray  
3) To make Conical Funnel  
4) To make Elbow Pipe.

III. Forging Technology: Familiarity with different types of tools used in forging technology. Knowledge of different types of furnaces like coal fired, electrical furnaces etc...

Tasks to be performed:

1) To make round M.S rod to square  
2) To make L bend in given M.S. Rod.bar  
3) To make S bend in given M.S. Rod.  
4) To perform heat treatment tests like annealing, Normalizing etc...
IV. Fitting Technology: Familiarity with different types of tools used in fitting technology.

Tasks to be performed:

1) To make “V” – fitting  
2) To make square fitting 
3) To make Dovetail fitting  
4) To make Straight fitting 

V. House Wiring: 
1) Tube light connection 
2) Staircase connection 

Note: Any two jobs from each trade must be performed by the student.
ENGINEERING PHYSICS LAB

Subject Code: 13BS1101
Credits: 2

Course Objectives:
- To Demonstrate the Fundamental Principles of Physics
- To enable the student to acquire necessary patience, skill and technique in utilization of the Apparatus
- To Provide Modest experience that allows students to Analyze Data
- To correlate the Theory and Practice

Course Outcomes:
CO 1. Ability to Design and Conduct experiments as well as to Analyze and Interpret Data
CO 2. Ability to Identify, Formulate, and Solve Engineering Problems.
CO 3. Ability to use Techniques and Skills associated with Modern Engineering Tools such as Lasers and Fiber Optics
CO 4. To provide Pre Requisite Hands on Experience for Engineering Laboratories

LIST OF EXPERIMENTS:
(Any Twelve Experiments have to be completed)
1. Determination of Rigidity Modulus of the Material of Wire using Torsional Pendulum
2. Verification of Laws of Transverse vibrations in Stretched Strings using Sonometer
3. Wedge method – Determination of Thickness of Thin Object (hair)
4. Determination of Numerical Aperture and Bending Loss of an Optical Fiber
   5. Determination of Acceleration due to Gravity (g) using Compound Pendulum
6. Determination of Energy Band Gap using the given Semiconductor Diode
8. Slit Width Determination with Single Slit Diffraction Phenomena using LASER
9. Determination of Thermal Coefficient using Thermistor
10. Determination of Wavelength of Monochromatic Source using LASER Diffraction
11. Determination of the Frequency of the given Tuning Fork using Volume Resonator
12. Study of the variation of Magnetic Field along the axis of a Circular Coil using Stewart and Gee’s Method.
13. Diffraction Grating - Normal Incidence Method; Determination of Wavelength of given Source of Light using Spectrometer
14. Melde’s Experiment – Determination of the Frequency of the Electrically Driven Tuning Fork
15. AC Sonometer – Determination of Frequency of AC Supply

MANUAL / RECORD BOOKS:
2. Lab Manual of Engineering Physics by Dr.Y. Aparna and Dr. K. Venkateswara Rao (VGS books links, Vijayawada)
ELECTRONIC DEVICES AND CIRCUITS

Subject Code: 13EC2007  
Credits: 3

Internal Marks: 30  
External Marks: 70

Course Objectives:
- The objective of the EDC is to study semiconductor physics, junction diode characteristics, special diodes, design of rectifiers, filters and to learn about transistors, FETs, transistor biasing, small signal low frequency transistor models. Concepts of feedback amplifiers and oscillators are also to be dealt.

Course Outcomes:
CO1: Students are able to design rectifiers, filter circuits and analyses the feedback amplifiers and oscillators.

UNIT I:

Junction Diode Characteristics  : Open circuited P N Junction, Forward and Reverse Bias, Current components in PN Diode, Diode Equation,Volt-Amper Characteristic, Temperature Dependence on V – I characteristic, Step Graded Junction, Diffusion Capacitance and Diode Resistance (Static and Dynamic), Energy Band Diagram of PN Diode,

UNIT II:
Special Diodes: Avalanche and Zener Break Down, Zener Characteristics, Tunnel Diode, Characteristics with the help of Energy Band Diagrams, Varactor Diode, LED

Rectifiers and Filters: Half wave rectifier, ripple factor, full wave rectifier(with and without transformer), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, Π- section filter, Multiple L- section and Multiple Π section filter, and comparison of various filter circuits in terms of ripple factors, Simple circuit of a regulator using zener diode

UNIT III:
Transistors : Junction transistor, Transistor current components, Transistor as an amplifier, Characteristics of Transistor in Common Base and Common Emitter Configurations, Analytical expressions for Transistor Characteristics, Punch Through/ Reach Through, Photo Transistor, Typical transistor junction voltage values.

Field Effect Transistors: JFET characteristics (Qualitative and Quantitative discussion), Small signal model of JFET, MOSFET characteristics (Enhancement and depletion mode), Symbols of MOSFET, Introduction to SCR and UJT and their characteristics,
UNIT IV:
**Transistor Biasing and Thermal Stabilization**: Transistor Biasing and Thermal Stabilization: Operating point, Basic Stability, Collector to Base Bias, Self Bias Amplifiers, Stabilization against variations in $V_{BE}$, and $\beta$ for the self bias circuit, Stabilization factors, ($S, S', S''$), Bias Compensation, Thermal runaway, Thermal stability

**Small signal low frequency Transistor models**: Two port devices and the Hybrid model, Transistor Hybrid model, Determination of h-parameters from characteristics, Measurement of h-parameters, Conversion formulas for the parameters of three transistor configurations, Comparison of Transistor Amplifier configurations

UNIT V:
**Feedback Amplifiers and Oscillators**: Classification of Amplifiers, Feedback concept, Transfer Gain with feedback, General characteristics of negative feedback amplifiers, Effect of Feedback on input and output Resistances, Voltage series, voltage shunt, current series, and current shunt feedback amplifiers with discrete components circuits (Analysis is not required) Conditions for oscillations. RC-phase shift oscillator with Transistor and FET, Hartley and Colpitts oscillators, Wein bridge oscillator

**TEXT BOOKS**

**REFERENCE BOOKS**
4. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky,
ELECTRICAL CIRCUIT ANALYSIS –I

Subject Code: 13EE2004  Internal Marks: 30
Credits: 3  External Marks: 70

Course Objectives:
- 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, theorems, two port networks and network topology.

Course Outcomes:
CO1: Students are able to understand single phase circuits, theorems, two port networks and network topology.

UNIT I:
Circuit concepts and Resonance: Circuit concepts –star-to-delta or delta-to-star transformation, Nodal analysis, mesh analysis, super node and super mesh analysis. Resonance-series, parallel circuits, concept of band width and Q factor - Locus diagrams - series R-L, R-C, R-L-C and parallel combination with variation of various parameters.

UNIT II:

UNIT III:
Network theorems – I: Superposition, Thevenin’s, Norton’s and Reciprocity Theorems for D.C and sinusoidal excitations(for independent and dependent sources).

UNIT IV:
Network theorems – II: Maximum Power Transfer, Millman’s, Tellegen’s, and compensation Theorems for D.C and sinusoidal excitations (for independent and dependent sources).
UNIT V:

**Two Port Networks**: Two port network parameters – Z, Y, ABCD (transmission) and hybrid parameters and their relations, inverse transmission & Hybrid parameters, Series and parallel two-Port Networks.

**TEXT BOOKS**:  
2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.

**REFERENCE BOOKS**:  
3. Electric circuits in SI units by Joseph A Edminister, MSE, 1st Edition  
4. Electrical Circuits by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill.
ELECTRICAL MACHINES – I

Subject Code: 13EE2005
Credits: 3
Internal Marks: 30
External Marks: 70

Course Objectives:
- This course is designed to have knowledge and exposes to DC machines with the concepts of generating principles and characteristics of DC machines, Motoring principle, speed control and their applications, testing of DC machines.

Course Outcomes:
CO1: Students are able to understand the Electro mechanical energy conversion principles, Constructional details, principle of operation, Performance, starters, speed control and testing of DC Machines, and its applications.

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:

UNIT III:
UNIT IV:
**D.C. Motors**: D.C Motors – Principle of operation – Back E.M.F. - Torque equation – characteristics of shunt, series and compound motors – Armature reaction and commutation, Losses and Efficiency.

**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 — Application of DC Motors.

UNIT V:
**Testing of D.C. Machines**: Testing of d.c. machines: methods of testing:-Brake test, Indirect testing: Swinburne’s method-- Regenerative or Hopkinson’s method-- Field’s test for series machines—Retardation test-- separation of losses

**TEXT BOOKS:**

1. Electrical Machines – P.S. Bimbra., Khanna Publishers

**REFERENCE BOOKS:**

3. Electrical Machines by J.B.Guptha. S.K.Kataria & Sons
ELECTROMAGNETIC FIELDS

Subject Code: 13EE2006
Credits: 3
Internal Marks: 30
External Marks: 70

Course Objectives:
- To have knowledge in fundamentals of static electric, magnetic, dynamic electromagnetic fields and their applications, which is the backbone of electrical engineering.

Course Outcomes:
CO1: On completion of the course the student shall be able to analyse potential problems within electrostatics, magneto statics and stationary current distributions in linear, isotropic media, and also solve such problems in simple geometries.

UNIT I:
Vectors Analysis: Scalar, Vector, Field, Scalar & Vector Products, Vector component, Unit vector, Unit vector normal to a plane, Vector Triple product, Co-ordinate systems-Cartesian, Cylindrical, Spherical, differential length, area, volume in these co-ordinate systems, Importance of divergence, curl, grad and Laplacian.
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, \( \text{div}(D) = \rho_v \).

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 – Behaviour of conductors in an electric field – Conductors and Insulators.
Dielectrics & Capacitance: Electric field inside a dielectric material – polarization – Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics

UNIT III:
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, \( \text{div}(B) = 0 \). Ampere’s circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere’s circuital law – Maxwell’s third equation, Curl \((H)=J\), Field due to a circular loop, rectangular and square loops.
UNIT IV:

UNIT V:
Self and Mutual Inductances: 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.


TEXT BOOKS:

REFERENCE BOOKS
2. Electrical field theory by Gangadhar, Khanna publishers.
3. Electro Magnetic field theory by Edminister, TMH publishers
FLUID MECHANICS & HYDRAULIC MACHINES

Subject Code: 13ME2008
Credits: 3
Internal Marks: 30
External Marks: 70

Course Objectives:
• To provide knowledge on different fluid properties and fluid flow.
• To provide basic knowledge on hydraulic turbines and pumps.

Course Outcomes:
CO1: The students will get a clear idea about fluid flow and losses involved in flow.
CO2: The student gains confidence to analyze power transmission through different hydraulic equipment.

UNIT I
Introduction: Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion, pressure at a point, Pascal’s law, Hydrostatic law - atmospheric, gauge and vacuum pressure - measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers.

UNIT II:
Fluid kinematics: Description of fluid flow, 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, two dimensional flows – stream and velocity potential functions.

Fluid dynamics: Surface and body forces – Euler’s and Bernoulli’s equations for flow along a stream line for 3-D flow, Navier – Stokes equations (Explanationary) Momentum equation and its application – forces 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:
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.
Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.
UNIT V:
**Centrifugal pumps:** classification, working, work done – manometric head – losses and efficiencies- specific speed- pumps in series and parallel-performance characteristic curves, NPSH.

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

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
SWITCHING THEORY AND LOGIC DESIGN

Subject Code: 13EC2003
Credits: 3
External Marks: 70
Internal Marks: 30

Course Objective:
- With this course, students will learn different number systems and their applications, Boolean Algebra, Minimization of Switching functions, Karnaugh map method, Tabulation method, Logic gates, Combinational Logic circuits, sequential Logic circuits and to identify suitable designing procedures for the given problems.

Course Outcome:
CO1: After completing this course student should be able to know how to Minimize Switching functions and able to know how to design combinational logic circuits, sequential logic circuits and memories.

UNIT I:
Review of Number systems: Number systems Base conversion methods, complements of numbers, r’s, r-1’s compliment subtraction. BCD, Excess-3, Alphanumeric code, self complement codes, 2421, gray code, error detection & correction codes, Parity checking codes, Hamming codes.

UNIT II:
Logic operations: Logic Gates, Boolean theorems, complements and dual of logic expressions, standard SOP & standard POS. Minimization of logic functions using theorems. Multi level NAND – NAND, NOR-NOR Realizations.

UNIT III:
Minimization of switching functions: Minimization of switching functions using K-Map up to 5-variables, code converters and binary multiplier using K-Map, Tabular minimization.

UNIT IV:
Combinational logic circuits: Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary adder, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess3 adder circuit, look-a-head adder circuit. Design of decoder, Encoder, multiplexer, demultiplexer, priority encoder, comparator, seven segment display.
UNIT V:

TEXTBOOKS:
1. Digital design by Mano 2nd edition PHI.
3. Modern Digital Electronics by RP Jain, TMH.

REFERENCE BOOKS:
ELECTRONIC DEVICES AND CIRCUITS LAB

Subject Code: 13EC2102  Internal Marks: 25
Credits: 2       External Marks: 50

Course Objectives:
The main objective of this curriculum/course is to make the students well versed with basic electronic components and circuits. The students can
- Understand the nature and scope of modern electronics.
- Describe physical models of basic components.
- Understand their capabilities and limitations and make decisions regarding their best utilization in a specific situation.

Course Outcomes:
The combination of lecture and laboratory sessions provides learning opportunities that should enable the student to do the following upon completion of this course:

CO 1. Set up a bias point in a transistor.
CO 2. Verify the working of diodes, transistors and their applications.
CO 3. Build a common emitter/base/collector amplifier and measure its voltage gain.
CO 4. Understand the use of RPS and CRT.
CO 5. Explore the operation and advantages of operational amplifiers.
CO 6. Learn to design different types of filters and apply the same to oscillators and amplifiers.
CO 7. Exploring the circuitry which converts an analog signal to digital signal.

LIST OF EXPERIMENTS ( Ten experiments to be done) :

1. Frequency measurement using Lissajous Figures
2. PN Junction diode characteristics A. Forward bias  B. Reverse bias.( cut-in voltage & Resistance calculations)
3. Zener diode characteristics and Zener as a regulator
4. Transistor CB characteristics (Input and Output) & h Parameter calculations
5. Transistor CE characteristics (Input and Output) & h Parameter calculations
6. Rectifier without filters (Full wave & Half wave)
7. Rectifier with filters (Full wave & Half wave)
8. FET characteristics
9. UJT Characteristics
10. CE Amplifier
11. CC Amplifier (Emitter Follower).
FLUID MECHANICS & HYDRAULIC MACHINES LAB

Subject Code: 13ME2106
Credits: 2

Internal Marks: 25
External Marks: 50

Course Objectives:
- To give the practical exposure to the students about the fundamentals of fluid mechanics and hydraulics.
- To provide the practical knowledge about the turbo machinery.

Course Outcomes:
CO 1. The students can acquire the knowledge about the practical applications of fluid mechanics in real field.
CO 2. Student achieves the knowledge about the characteristic behavior of turbo machinery under various working conditions.

LIST OF EXPERIMENTS:
(Any 10 of the above 12 experiments are to be conducted)

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.
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.
ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY
(Common for all Branches)

Subject Code: 13HS2102 Internal Marks: 25
Credits: 2 External Marks: 50

Course Objectives:
• To make the students to adopt themselves to the situations and converse using their spontaneity.
• To make the students acquiring the language proficiency.
• To provide the real life situations to emulate the language properly.
• To make them realize the importance of Stress, Intonation and Rhythm of language.
• To make the students to improve pronunciation, vocabulary, language skills, communication skills, body language and grammar to fulfill the demands of the employer.

Course Outcomes:
CO 1. To improve the communication skills through Listening & Practicing the structures of Language.
CO 2. Students will be able to master Technical and Communicative English Language & LSRW skills, both Verbal (Oral & Written) & Non-verbal.

List of Sessions
UNIT I: Vocabulary Development
UNIT II: Reading Comprehension
UNIT III: Presentation Skills
UNIT IV: Group Discussions
UNIT V: Resume Writing & Interview Skills

TEXT BOOKS:
• “Strengthen your Steps” by Dr. M. Hari Prasad, Dr. John Varghese, Dr. R. Kishore Kumar, Maruthi Publications, Hyderabad (2010)

REFERENCE BOOKS
• How to Prepare for Verbal Ability and Reading Comprehension for CAT by Arun Sharma
PROFESSIONAL ETHICS & MORALS

Subject Code: 13HS2201
Credits: --

Course Objectives:
• To help students to regulate their behavior in a professional environment as employees.
• To understand organizational culture and adapt to varying cultures without compromising on ethical values.

Course Outcomes:
CO 1. Students will be able to adjust themselves in varying work cultures.
CO 2. Retain and strengthen their value systems.
CO 3. Develop inter personal and intra personnel skills.
CO 4. Make valuable contribution to society through improvement in Human Development index.

UNIT I:

UNIT II:

UNIT III:
UNIT IV:

UNIT V:
Case Studies – Variety of Moral Issues in Profession:

TEXT BOOKS:

REFERENCE BOOKS:
Course Objectives:
- Verify if a function is harmonic and then find a harmonic conjugate via the Cauchy-Riemann equations, evaluate contour integrals.
- Identify when the theorems are applicable and evaluate contour integrals using the Cauchy Integral Theorem and the Cauchy Integral Formula in basic and extended form.
- Identify and classify zeros and singular points of functions, understand residues, calculate the residues by Laurent Series & residue theorem. To use residues to evaluate various contour integrals.
- Identify the images from z-plane to w-plane and determine the bilinear transformations.
- Understand the conditional probability, binomial, poisson and normal distributions. Understand the concepts of sampling and sampling distributions.
- Test the hypothesis using normal and non-normal distributions.

Course Outcomes:
CO 1. Can verify if a function is harmonic and find a harmonic conjugate via the Cauchy-Riemann equations, evaluate contour integrals.
CO 2. Can identify when the theorems are applicable and evaluate contour integrals using the Cauchy Integral Theorem and the Cauchy Integral Formula in basic and extended form.
CO 3. Able to identify and classify zeros and singular points of functions, understand residues, calculate the residues by Laurent Series & residue theorem. To use residues to evaluate various contour integrals.
CO 4. Able to find the images of different complex functions and mapping from z-plane to w-plane and determines the bilinear transformations.
CO 5. Sets up probability models for a range of random phenomena, both discrete and continuous.
CO 6. Is able to apply the notions of conditional probability, recognize where the use of certain standard probability distributions would be appropriate.
CO 7. Understand the principles of hypothesis testing; apply a range of statistical tests.

UNIT I:
UNIT II:
Integration using Residues: Singular point - isolated singular point - pole of order m - essential singularity. Residue- Evaluation of residue by formula and by Laurent series - Residue theorem. Evaluations of integrals of the type

(a) Improper real integrals \[ \int_{-\infty}^{\infty} f(x)dx \]
(b) \[ \oint_{C} f(\cos \theta, \sin \theta)d\theta \]
(c) \[ \int_{-\infty}^{\infty} e^{imx} f(x)dx \]
(d) Integrals by indentation.

UNIT III:
Conformal Mapping: Conformal mapping- Transformation by \( e^z \), \( \ln z \), \( z^2 \), \( z^n \) \( (n \text{ is positive integer}) \), \( \sin z \), \( \cos z \), \( z+a/z \). Translation, rotation, inversion and bilinear transformation - fixed point - cross ratio - properties-invariance of circles and cross ratio - determination of bilinear transformation mapping 3 given points.

UNIT IV:

UNIT V:
Sampling Distributions and Test of Hypothesis: Population and Samples, sampling distribution of mean (with known and without known variance) proportions, variances. Sampling distribution of sums and differences.(No Derivations) Statistical Hypothesis: Type I and Type-II Errors and their calculations. One tail, two tail tests. Test of hypothesis concerning means, proportions and their differences using \( Z \)-test, Student’s \( t \)-test, \( F \)-test, and \( \chi^2 \) –test.

TEXT BOOKS:
3 Probability and Statistics for Engineers, Miller and John E.Freund, Prentice Hall of India
4 Higher Engineering Mathematics B.S.Grewel.

REFERENCE BOOKS:
1 Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt.Ltd.
CONTROL SYSTEMS

Subject Code: 13EE2009
Credits: 3

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

Course Outcomes:
CO1: Students are able to understand the representation of the mathematical model of a system, the response of different order systems for various step inputs, stability of the system using different plots, different compensation techniques and state space analysis.

UNIT I:
Introduction: Concepts of Control Systems- Open Loop and closed loop control systems-examples- Classification of control systems- Feedback characteristics- Effects of feedback characteristic.
Mathematical models of physical systems: Differential equations- transfer functions and block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason’s gain formula - Translational and Rotational mechanical systems.

UNIT II:
Transfer function of elements of control systems: Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver,

UNIT III:
Concept of stability: The concept of stability – Routh’s stability criterion – qualitative stability and conditional stability
Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT IV:
Frequency response analysis: Introduction, Frequency domain specifications-Bode plots-Determination of Frequency domain specifications and transfer function from the Bode plot-Phase margin and Gain margin-Stability Analysis from Bode Plots.Polar Plots- Nyquist Plots- Stability Analysis.
UNIT V:
**Design and Compensation techniques:** Introduction and preliminary design considerations- Lag, Lead, Lead-Lag compensation based on frequency response approach.

**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.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
3. B.C.Kuo
ELECTRICAL CIRCUIT ANALYSIS-II

Subject Code: 13EE2010  Internal Marks: 30
Credits: 3  External Marks: 70

Course Objective:
- This course aims at study of Three Phase systems- Balanced & Unbalanced, D.C & A.C Transient analysis, Network synthesis and classical filters for the future study and analysis of Power Systems.

Course Outcomes:
CO1: Students are able to understand the three phase balanced and unbalanced circuits, AC & DC transient analysis, classical filters and Network synthesis.

UNIT I:
Balanced Three phase circuits: Three phase circuits: Phase sequence- Star and delta connection-Relation between line and phase voltages and currents in balanced systems-Analysis of balanced three phase circuits-Measurement of Active and Reactive power in balanced three phase systems.
Unbalanced Three phase circuits: Analysis of Three Phase unbalanced circuits-Loop Method-Application of Millman’s Theorem- Star Delta Transformation Technique.

UNIT II:

UNIT III:

UNIT IV:
Network Synthesis: Introduction, Causality and stability, Hurwitz polynomial, Routh’s criterion, Positive real functions, Sturm’s theorem, Elementary synthesis procedures, L-C Immittance functions(Foster form-1,Foster form-2, First Cauer form, Second Cauer form), R-C Impedance functions(Cauer forms of RC networks), R-L Impedance or R-C Admittance functions(Cauer forms of R-L Impedance or R-C Admittance), Problems.
UNIT V:
Classical Filters: Introduction, Classification of Filters, Characteristics Impedance, Low pass constant –k type filter, High pass constant –k type Filter, Band pass constant –k type Filter, Band stop or Band elimination constant –k type Filter, m-derived Filters(m-derived pi section LPF), m-derived High pass Filter T- section, m-derived Band pass Filter, composite Filters, Problems.

TEXT BOOKS:
2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.

REFERENCE BOOKS:
2. Electric circuits in SI units by Joseph A Edminister, MSE, 1st Edition
3. Electrical Circuits by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill.
ELECTRICAL MACHINES – II

Subject Code: 13EE2011
Credits: 3
Internal Marks: 30
External Marks: 70

Course Objective:
- This subject facilitates the study of Transformers, Induction Motors which are the major parts of AC machines.

Course Outcomes:
CO1: Student can able to understand the construction details of a transformer, losses, efficiency and regulation of transformer, different tests on transformer, induction motor characteristics and starting methods and speed control methods for induction motor.

UNIT I:

UNIT II:
Testing of Transformer: OC and SC tests - Sumpner’s test -Separation of losses -Parallel operation with equal and unequal voltage ratios – Auto transformers-equivalent circuit - comparison with two winding transformers.
Three-Phase Transformers: Types of connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ -- Third harmonics in phase voltages-three winding transformers- tertiary windings-determination of Zp, Zs and Zt -- transients in switching - off load and on load tap changers -- Scott connection.

UNIT III:
3-phase Induction Motors: Construction details of cage and wound rotor machines - production of a rotating magnetic field – principle of operation – rotor emf and rotor frequency – rotor current and pf at stand still and during running conditions – Rotor Power input, rotor copper loss and mechanical power developed and their inter relationship,Torque equation- expressions for maximum torque and starting torque - torque slip characteristic - equivalent circuit - phasor diagram - double cage and deep bar rotors - crawling and cogging.

UNIT IV:
Testing’s and Starting methods: No load and blocked rotor tests- Circle diagram for predetermination of performance-methods of starting direct on line starting, Autotransformer starting,star-delta starting and starting current and torque calculations
UNIT V:

**Speed Control Methods:** Stator voltage control – frequency control – Pole changing -- cascade connection. injection of an emf into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

**TEXT BOOKS:**
1. Electrical Machines – P.S. Bimbra., Khanna Publishers
2. Performance of Electrical Machines – M.G. Say

**REFERENCE BOOKS:**
3. Electrical Machines by J.B. Guptha. S.K. Kataria & Sons
Course Objective:
- Electrical Power plays significant role in day to day life of entire mankind. This course concerns the generation and distribution of power along with the economic aspects.

Course Outcomes:
CO1: Students are able to understand the components required for different power generations, operation principle of power generations, working of different substations and underground cables and differentiate the tariff methods for energy consumption.

UNIT I:
**Thermal & Hydel Power Stations:** Site selection, Line diagram of Thermal Power Station showing paths of coal, steam, water, air, ash and flue gasses- Brief description of TPS components: Boilers, Super heaters, Economizers, Turbines, Condensers, Cooling towers, and Chimney, Electro Static Precipitator, Hydro power plants.

UNIT II:

UNIT III:
**Distribution Systems:** Classification of distribution systems, design features of distribution systems, radial distribution, ring main distribution, voltage drop calculations: DC distributors for following cases: radial DC distributor fed at one end and at ends (equal / unequal voltages), ring main distributor, stepped distributor and AC distribution. Comparison of DC and AC distribution.
**Substations**
Classification of substations: Air insulated substations - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment.
33/11 KV substation line diagram.
UNIT IV:

UNIT V:
Gas insulated substations (GIS): Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations.

TEXT BOOKS:
2. Electrical Power system by S.L.Uppal.

REFERENCE BOOKS:
1. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age
ELECTRICAL CIRCUIT ANALYSIS LAB

Subject Code: 13EE2105
Credits: 2

Course Objective:
• This lab aims to understand and analyze the network theorems, other network concepts through the conduction of experiments

Course Outcomes:
CO1: Can understand and verify the network theorems.
CO2: Understood the Locus diagram of RL &RC circuits.
CO3: Understood the Series & Parallel resonance, importance of Quality of factor.
CO4: Know the calculation of two port network parameters for a given network.
CO5: Able to measure active power for Star & Delta connected loads.

LIST OF EXPERIMENTS:
Any 10 of the following experiments are to be conducted:

1) Verification of Thevenin’s Theorem
2) Verification of Norton’s Theorem
3) Verification of Superposition theorem
4) Verification of Compensation Theorem and Maximum Power Transfer Theorem
5) Verification of Reciprocity, Millmann’s Theorem
6) Locus Diagrams of RL and RC Series Circuits
7) Frequency response of Series and Parallel RLC circuit.
8) Determination of Self, Mutual Inductances and Coefficient of coupling of a Transformer.
9) Determination of Z and Y Parameters of Two-Port network.
10) Determination of Transmission and hybrid parameters of Two-Port network.
11) Measurement of Active Power for Star and Delta connected balanced loads
12) Measurement of 3-phase Power by 2 Wattmeter Method for unbalanced loads
CONTROL SYSTEMS LAB

Subject Code: 13EE2106
Credits: 2

Course Objectives:
- To highlight the electrical modeling of a second order system and analyse the under-damped, over-damped and critically damped cases
- To study the effects of poles and zeros location in the s-plane on the transient and steady state behavior
- To study the effects of Lead, Lag and Lag-Lead series compensator on a second Order system transient and steady state system response.
- To familiarize students with Servo-Motor.
- To study the operation of magnetic amplifier and synchros.
- To study root locus, bode plot and state space analysis from MATLAB

Course Outcomes:
Student can understand
CO 1. Modeling of second order system.
CO 2. Lead –Lag compensation, DC servo motor magnetic amplifier.

LIST OF EXPERIMENTS: (Any Ten of the following experiments are to be conducted)
1  Time response of Second order system
2  Characteristics of Synchros
3  Effect of feedback on DC servo motor
4  Transfer function of DC motor
5  Effect of P, PD, PI, PID Controller on a second order systems
6  Lag and lead compensation – Magnitude and phase plot
7  Transfer function of DC generator
8  Temperature controller using PID
9  Characteristics of magnetic amplifiers
10 Characteristics of AC servo motor
11 Root locus and bode plot from MATLAB
12 State space model for classical transfer function using MATLAB-verification.
13 Simulation of transfer function using operational amplifiers.

REFERENCE BOOKS:
1  Simulation of Electrical and electronics Circuits using PSPICE – by M.H.Rashid, PHI Publications.
2  MATLAB and its Tool box user’s manual and – Math works, USA.
ELECTRICAL MACHINES LAB – I

Subject Code: 13EE2104  
Credits: 2

Internal Marks: 25
External Marks: 50

Course Objectives:
- This lab aims to understand the characteristics and performance of DC machines through the conduction of experiments.

Course Outcomes:
CO 1. Can understand the characteristics of DC machines
CO 2. Able to determine the performance of DC machines through different tests

LIST OF EXPERIMENTS:

Any 10 of the following experiments are to be conducted:
1. Magnetization characteristics of DC shunt generator.
2. Load test on DC shunt generator.
3. Brake test on DC shunt motor.
4. Load test on DC compound generator.
5. Hopkinson’s test on DC shunts machines.
6. Fields test on DC series machines.
7. Swinburne’s test.
8. Speed control of DC shunt motor by Field and armature Control
10. Load test on DC series generator.
11. Retardation test on DC shunt motor.
SELF STUDY COURSE-I

Subject Code: 13EE2201
Credits: 1

Internal Mark: 75
External Marks: --

Course Objectives:
- Identify sources of information.
- Collecting relevant information.
- Ability to interpret information
- Ability to move from problem to solution.

Course Outcomes:
CO 1. Acquires ability to locate sources of information.
CO 2. Acquires ability to filter and select relevant information
CO 3. Apply information to real world problems and solve them.

Syllabus
- Data collection through Internet
- Data collection from Library and other sources
- Seminar/Presentation
- Group discussion

On Identified topics, Current trends and emerging technologies like Modeling and simulation of different Electrical Engineering systems.
POWER SYSTEMS – II

Subject Code: 13EE3014
Internal Marks: 30
Credits: 3
External Marks: 70

Course Objectives:
- To develop expression for computation of fundamental parameters of lines and categorize the lines into different classes and develop equivalent circuits for these classes and analyse the voltage distribution in insulator string to study different cables and adjustable voltage distribution in the cables and methods to improve the same.

Course Outcomes:
CO 1. Students are able to understand different parts of a typical power system, use of high voltages in transmission of electrical power, categorize the power lines by voltage and explain their applications, functions of different parts of an overhead power lines, different types of electrical power distribution systems and their Characteristics.

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,

UNIT II:

UNIT III:
UNIT IV:


TEXT BOOKS:

REFERENCE BOOKS:
4 Power system Analysis-by John J Grainger William D Stevenson, TMC Companies, 4th edition
ELECTRICAL MACHINES – III

Subject Code: 13EE3015
Credits: 3

Course Objectives:
- To develop knowledge on Principles & operation, construction, performance, maintenance & testing of Synchronous Machines. Further acquiring knowledge on construction, principle and operation, performance of AC series motors, Repulsion motors, Reluctance motors, Hysteresis motors and Stepper motors.

Course Outcomes:
CO 1. Enable the students to have a fair knowledge about the construction and operation of synchronous machines and special machines. Students will be in a position to test and analyse the performance of these machines.

UNIT I:

UNIT II:
Regulation of Alternator: Regulation by synchronous impedance method, M.M.F. method and Z.P.F. methods– salient pole alternators – two reaction analysis –determination of Xd and Xq (Slip test) Phasor diagrams - Regulation of salient pole alternators - Synchronizing the alternators with infinite bus bars.

UNIT III:
Parallel Operation of Alternators: Parallel operation and load sharing - Effect of change of excitation and mechanical power input.

UNIT IV:
UNIT V:

**TEXT BOOKS**

**REFERENCE BOOKS:**
ELECTRICAL MEASUREMENTS

Subject Code: 13EE3016
Credits: 3

Course Objectives:
- 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.

Course Outcomes:
CO 1. Students are able to understand the Measurement of all DC and AC quantities such as current, voltage, power factor, power, energy, frequency and magnetic measurements could be understood and could be useful in the industry.

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

UNIT II:

UNIT III:

UNIT IV:
Resistance Measurements: sensitivity of Wheatstone’s bridge – Carey Foster’s bridge, Kelvin’s double bridge for measuring low resistance, measurement of high resistance, unbalanced Kelvin’s bridge – loss of charge method.

UNIT V:

TEXT BOOKS:

REFERENCE BOOKS:
1 Electrical Measurements – by Buckingham and Price, Prentice – Hall
2 Electrical Measurements by Harris.
5 F.K. Harris, Electrical Measurements”, Wiley Eastern Pvt. Ltd., 1974
LINEAR AND DIGITAL IC APPLICATIONS

Subject Code: 13EC3016
Credits: 3
Internal Marks: 30
External Marks: 70

Course Objectives:
• To introduce the basic building blocks of linear integrated circuits.
• To teach the linear and non-linear applications of operational amplifiers.
• To introduce the theory and applications of IC 555 Timer and PLL.
• To teach the theory of ADC and DAC
• To teach combinational and sequential circuit design using different IC’S.

Course Outcomes:
CO 1. On completion of this course, the students will have a thorough understanding of operational amplifiers with linear integrated circuits. Also students will be able to design circuits using operational amplifiers for various applications.

UNIT I:
Integrated Circuits: Classification, chip size and circuit complexity, basic information of Op-amp, ideal and practical Op-amp, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, frequency compensation techniques, measurement of opamp parameters.

UNIT II:
Op-Amp Applications: Basic application of Op-amp-inverting, non-inverting amplifiers, instrumentation amplifier, ac amplifier, V to I and I to V converters, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators, oscillators waveform generators – triangular, sawtooth, square wave.

UNIT III:
Active Filters: Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters.

Timers & Phase Locked Loops: Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. VCO, PLL - introduction, block schematic, principles and description of individual blocks of 565.
UNIT IV:
**D-A AND A-D Converters:** Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC1408 DAC. Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC specifications.

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 V:
**Combinational Circuits:** Design using TTL-74XX & CMOS 40XX series, code converters, decoders, Demultiplexers, decoders & drives for LED & LCD display. Encoder, priority Encoder, multiplexers & their applications, priority generators/checker circuits. Digital arithmetic circuits-parallel binary adder/subtractor circuits using 2’s, Complement system. Digital comparator circuits.

**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**

**REFERENCE BOOKS:**
PULSE AND DIGITAL CIRCUITS

Subject Code: 13EC3017
Credits: 3

Course Objectives:

- Students will understand the concepts of wave shaping, Switching Characteristics of Diode and Transistor, Multivibrators and Time Base Generators & Sampling Gates in Pulse and digital circuits. Students can design a circuit based on requirement.

Course Outcomes:

CO1: Students are able to understand the Linear & Non linear wave shaping, Switching Characteristics of Diode and Transistor, Multivibrators and Time Base Generators & Sampling Gate.

UNIT I:
Linear wave shaping: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT II:
Non – Linear Wave Shaping: Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clamps.

UNIT III:
Switching Characteristics of Devices: Diode and Transistor as switches, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times, Junction switching times of diode.

UNIT IV:

UNIT V:

TEXT BOOKS:

REFERENCE BOOKS:
SIGNALS AND SYSTEMS

Subject Code: 13EC3018 Internal Marks: 30
Credits: 3 External Marks: 70

Course Objectives:
- Coverage of continuous and discrete-time signals and systems, their properties and representations and methods that are necessary for the analysis of continuous and discrete-time signals and systems.
- Knowledge of time-domain representation and analysis concepts as they relate to difference equations, impulse response and convolution, etc.
- Knowledge of frequency-domain representation and analysis concepts using Fourier Analysis tools, Z-transform
- Concepts of the sampling process
- Mathematical and computational skills needed in application areas like communication, signal processing and control, which will be taught in other courses.

Course Outcomes:
CO1: Characterize and analyze the properties of CT and DT signals and systems
CO2: Analyze CT and DT systems in Time domain using convolution.
CO3: Represent CT and DT systems in the Frequency domain using Fourier Analysis tools like CTFS, CTFT, DTFS and DTFT.
CO4: Conceptualize the effects of sampling a CT signal
CO5: Analyze CT and DT systems using Laplace transforms and Z Transforms.

UNIT I:
Introduction To Signals And Systems: Introduction- Continuous time signals (standard continuous time signals), discrete time signals (standard discrete time signals), operations on signals, classification of signals, introduction to systems, examples, interconnection of systems, basic properties of systems, time domain representation of continuous time LTI systems, convolution integral, properties of convolution, differential equation representation of continuous time LTI systems, time domain representation of discrete time LTI systems, convolution sum, properties of convolution, difference equation representation of discrete time LTI systems.

UNIT II:
UNIT III:
**Fourier Transforms:** Fourier Integrals and Fourier Transforms – properties of Fourier Transforms and Application to Electrical Circuits.

UNIT IV:
**Laplace Transforms:** Introduction, definition of Laplace transform, Region of convergence, properties of Laplace transforms, unilateral Laplace transforms, causality and stability analysis using LT, Inverse Laplace transforms, relation between LT and FT.

UNIT V:
**Z-Transforms:** Introduction, definition of Z-transform, Z-transform and ROC of finite duration, infinite duration signals, causality and stability analysis using Z-transforms, properties of Z-transforms, inverse Z-transform, block diagram representation, relation between Z-transform and DTFT, relation between Z-transform and Laplace transform.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
ELECTRICAL MACHINES LAB – II

Subject Code: 13EE3107
Credits: 2

Course Objectives:
- To develop hands on experience with transformers, induction and synchronous machines by allowing them to conduct various experiments on transformers, induction and synchronous machines.

Course Outcomes:
CO1: The students will know to calculate the performance of transformers, single and three phase induction motors the regulation of alternators by various methods, load sharing, performance of motors, measurement of Xd & Xq parameters, parallel operation of transformers etc.

LIST OF EXPERIMENTS:
Any Ten of the following Experiments are to be conducted

1. O.C. & S.C. Tests on a Single phase Transformer
2. Sumpner’s test on single phase transformers
3. Parallel operation of Single phase Transformers
4. Separation of core losses of a single phase transformer
5. No-load & Blocked rotor tests on three phase Induction motor
6. Regulation of a three –phase alternator by synchronous impedance method.
7. Brake test on three phase Induction Motor
8. Regulation of three-phase alternator by Z.P.F. method.
9. Scott connection of Transformers.
11. Determination of Xd and Xq of a Salient pole Synchronous machine.
ELECTRICAL MEASUREMENTS LAB

Subject Code: 13EE3108
Credits: 2
Internal Marks: 25
External Marks: 50

Course Objective:
- To develop on hand experience with DC & AC bridges, oil Test Kit, single phase and three phase energy meters, transducers like LVDT & Strain Gauge to measure different electrical parameters like resistance, inductance, capacitance, frequency, power, energy and dielectric strength.

Learning Outcomes:
CO1: The students will be able to measure resistance, inductance, capacitance and frequency using various DC & AC bridges. The students will also know about measuring techniques of active power, reactive power and energy in electrical industry. They will be in a position to use oil test kit and transducers like LVDT and Strain gauge effectively for measuring different quantities.

LIST OF EXPERIMENTS:
The following experiments are required to be conducted as compulsory experiments:
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, at least 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 single watt meter and 2 No’s of C.T.
13. P.T. testing by comparison – V.G. as Null detector – Measurement of % ratio error and phase angle of the given P.T.
14. Dielectric oil testing using H.T. testing Kit
15. LVDT and capacitance pickup – characteristics and Calibration
16. Resistance strain gauge – strain measurements and Calibration
17. Polar curve using Lux meter, Measurement of intensity of illumination of fluorescent lamp.
18. Transformer turns ratio measurement using A.C Bridge.
INTELLECTUAL PROPERTY RIGHTS AND PATENTS

Subject Code: 13HS3202
Credits: --
Internal Marks: --
External Marks: --

Course Objective:
• What is intellectual property right, trade mark registration process ,trade mark litigation, copy right principle ,international trade mark law, copy right ownership ,right to prepare derivative work, introduction to trade secret, breach of contract can be known briefly.

Course Outcome:
CO1: Intellectual property rights, cyber law, transfer of rights, trade mark claim, trade mark maintenance, copy right principles ,copy right ownership could be applied in professional life.

UNIT I:

UNIT II:

UNIT III:
Introduction to Copyrights – Principles of Copyright Principles - subjects Matter of Copy right - Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration

UNIT IV:
Right to prepare Derivative works – Rights of Distribution – Right to Perform work Publicity Copyright Formalities and Registrations - Limitations - Copyright disputes and International Copyright Law – Semiconductor Chip Protection Act
UNIT V:

TEXT BOOKS:
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections

REFERENCE BOOKS:
POWER SYSTEMS-III

Subject Code: 13EE3017  Internal Marks: 30
Credits: 3  External Marks: 70

Course objectives:

- This course introduces to students various protection schemes of electrical equipment like generator, transformer and transmission lines. This course focuses on study of various types of electromagnetic and static relays. It also covers principle and operation of various types of circuit breakers and their ratings. This course will also describe substation protection and the need of neutral grounding / earthing in electric power systems.

Course Outcomes:

CO1: Students are able to understand the concepts and working of different types of switchgear, principle and working of different types of circuit breakers and relays, various protection schemes of power system components, concepts of over voltage protection and the need of neutral grounding and power system earthing.

UNIT I:


UNIT II:

UNIT III:  
**Generator & Transformer Protection:** Protection of Alternators: Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.  
**Protection of transformers:** Percentage Differential Protection, Numerical Problem on Design of CT’s Ratio, Buchholtz relay Protection.  

UNIT IV:  
**Feeder and Bus Bar Protection:** Protection of Lines: Over Current, Carrier Current and Three - zone distance relay protection using Impedance relays. Translay relay. Protection of Bus bars – differential Protection.  

UNIT V:  

TEXT BOOKS:  
2. Power System Protection and Switchgear by Badari Ram, D. N. Viswakarma, TMH Publications  

REFERENCE BOOKS:  
MANAGERIAL ECONOMICS AND MANAGEMENT SCIENCES

Subject Code: 13HS3005  
Credits: 2  
Internal Marks: 30  
External Marks: 70

Course Objectives:
- To understand managerial economics.
- To understand law of demand, elasticity of demand and demand forecasting techniques.
- To understand theory of production, cost analysis and its application in business.
- To understand market structure, different types of competition and pricing strategies.
- To understand of principles of management, leadership styles and social responsibility of an organization.
- To understand the concept of marketing and human resource management.

Course Outcomes:
CO 1. Learns the principles of economics and their applications in a business environment.
CO 2. Learns the relation between quantity and costs of production.
CO 3. Learns the behavior of markets and how organizations adopt the market conditions.
CO 4. Learns the principles of management and corporate social responsibility.
CO 5. Learns that human being is a resource and how handling these resource organizations become productive.

UNIT I:

UNIT II:

Cost Analysis: Cost concepts, Opportunity cost, Fixed & Variable cost, explicit costs & Implicit cost, Out of pocket cost & Imputed cost, Break-even Analysis (BEA), Determination of Break-Even Point (simple problems), Managerial Significance and limitations of BEA.

UNIT III:
UNIT IV:  

UNIT V:  
**Introduction to Marketing and Human Resource Management (HRM):** Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle, Channels of distribution.  
**Human Resources Management (HRM):** Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs. PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

**TEXT BOOKS:**

1. Varshney & Maheswari, Managerial Economics, Sultan & Chand, New Delhi, 2003  

**REFERENCES:**

POWER ELECTRONICS

Subject Code: 13EE3018
Credits: 3

Course Objectives:

- The objective of this course is to learn the concepts of Power Semi Conductor Devices and their applications in industries.

Course Outcomes:

CO1: Students are able to understand the theory of various power electronic devices, how to convert single phase and three phase AC voltage into DC voltage, to get a variable AC voltage and variable frequency, how to get a DC variable voltage from a fixed DC voltage, Learn how to convert DC voltage into AC voltage.

UNIT I:

Introduction to Power Semi Conductor Devices: Thyristors - Silicon Controlled Rectifiers (SCR’s) - BJT - Power MOSFET - Power IGBT and their characteristics - 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.


UNIT II:

Single Phase 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.

Fully controlled converters, Mid point and Bridge connections with Resistive, RL loads and RLE load- Derivation of average load voltage and current - Line commutated inverters without and with Free wheeling Diode, Effect of source inductance - Derivation of load voltage and current.

UNIT – III Three Phase 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).
UNIT IV:


UNIT V:

DC-DC Convertors & Inverters: Choppers - Time ratio control and Current limit control strategies - Step down choppers, Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper - load voltage expression, - Buck, Boost, Buck-Boost (Principle of operation only) Single Phase (Principle of operation of basic series and parallel Inverters) and three phase Inverters - PWM Techniques(singal, multiple and sinusoidal PWM).

TEXT BOOKS:

REFERENCE BOOKS :
5. Power Electronics: converters, applications & design by Nedmohan, Tore M. Undeland, Riobbins by Wiley India Pvt. Ltd.
COMPUTER ORGANIZATION AND ARCHITECTURE

Subject Code: 13CS3009
Credits: 3

Course Objectives:
- The objective of this course is to introduce students to entire circuit designs, services and business models of Electronics Commerce related applications. The course aims are To have a thorough understanding of the basic structure and operation of a digital computer, To study the different ways of communicating with I/O devices and standard I/O interfaces, To study the hierarchical memory system including cache memories and virtual memory, Appreciate the concept of an instruction set architecture, ISA, and the nature of a machine-level instruction in terms of its functionality and use of resources (registers and memory).

Course Outcomes:
CO1: Students are able to understand the basic structure of a digital computer, the fundamentals of modern computing systems, the functionality of their Components, design of instruction sets and their underlying execution, basic computer organization and the objectives of computer hardware design, Instruction set, Addressing modes, Register organization.

UNIT I:

UNIT II:

UNIT III:
Internal Memory: Memory system hierarchy; main memory organization; cache memory; virtual memory; Cache organization, Magnetic disk, Physical characteristics of disk systems, concepts of partitioning, paging, virtual memory, demand paging, and segmentation.
UNIT IV:
Peripheral processing & devices – I/O accessing and data transfer techniques; I/O channel and processor; Overview of different I/O devices.

UNIT V:
Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors. Multiple Processors, Interconnection Structure, arbitration, Symmetric Multiprocessors, Cache Coherence.

TEXT BOOKS:
2. Computer Organization and Architecture, William Stalling, 8/e, PHI.

REFERENCE BOOKS:
UNIX AND SHELL PROGRAMMING
(Elective – I)

Subject Code: 13EE3019  Internal Marks: 30
Credits: 3  External Marks: 70

Course objectives:
- Know about UNIX operating system
- know about important commands which are used in UNIX
- Learn about shell programming in UNIX
- To control the resources with various commands.

Course Outcomes:
CO 1. Mastery of the basic UNIX process structure and the UNIX file system.
CO 2. Understand all the UNIX utilities, and implement shell scripting.
CO 3. Mastery of simple UNIX filters
CO 4. Familiarity of UNIX pipes and redirection, UNIX environment, traps, signals, filter
parameters, filter options, UNIX contentions, and Regular Expressions.
CO 5. Mastery of at least one Shell scripting language.

UNIT I:
Introduction to Unix:- Architecture of Unix, Features of Unix, Unix Commands – PATH, man,
echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat,
more, wc, lp, od, tar, gzip.

UNIT II:
Unix Utilities:- Introduction to unix file system, vi editor, file handling, security by file
permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount,
umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin, Text processing utilities and
backup, detailed commands to be covered are tail, head, sort, nl, uniq, grep, egrep, fgrep, cut,
paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio.
UNIT III:

Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count characters, Words or Lines, Comparing Files.

Unit IV:


Unit V:


TEXT BOOKS:

REFERENCES:
1. Advanced Unix Programming, Dr. N.B. Venkateswarlu, B.S. Publication.
2. Unix for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson Education.
3. Unix Programming environment, Kernighan and Pike, PHI/Pearson Education.
H.V.D.C. TRANSMISSION
(Elective-I)

Subject Code: 13EE3020  Internal Marks: 30
Credits: 3  External Marks: 70

Course Objectives:
- This subject deals with the importance of HVDC transmission, analysis of HVDC converters, Faults and protections, Harmonics and Filters and MTDC systems

Course Outcomes:
CO 1. Understand the basics of HVDC Transmission systems, Learning about advantages and disadvantages of DC with AC Transmission. To have Knowledge about the Modern trends in HVDC Transmission.
CO 2. Understand the analysis of HVDC converters and characteristics of 6 and 12 pulse converters with and without overlapping.
CO 3. Understand the converter control characteristics, Various controlling methods of converters such as firing angle, current and extinction angle control. Learn the converter faults and their protection schemes.
CO 4. Understand generation of harmonics, its adverse effects and also the design of filters for harmonic elimination. Learn about Multi terminal DC systems.

UNIT I:


UNIT II:
Converter & HVDC System Control: Principal of DC Link Control - Converters Control Characteristics - Firing angle control - Current and extinction angle control - Effect of source inductance on the system; Starting and stopping of DC link; Power Control.
UNIT III:
**Reactive Power Control in HVDC**: Reactive Power Requirements in steady state-Conventional control strategies-Alternate control strategies sources of reactive power-AC Filters - shunt capacitors-synchronous condensers.

UNIT IV:
**Converter Fault & Protection**: Converter faults - protection against over current and over voltage in converter station - surge arresters - smoothing reactors - DC breakers - Audible noise-space charge field-corona effects on DC lines-Radio interference.

UNIT V:
**Harmonics & Filters**: Generation of Harmonics-Characteristics harmonics, calculation of AC Harmonics, Non-Characteristics harmonics, adverse effects of harmonics - Calculation of voltage & Current harmonics - Effect of Pulse number on harmonics
Types of AC filters, Design of Single and double tuned tuned filters –Design of High pass filters.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
EXTRA HIGHVOLTAGE TRANSMISSION
(Elective-I)

Subject Code: 13EE3021  
Credits: 3

Internal Marks: 30  
External Marks: 70

Course Objectives:
• This subject deals the concepts of EHV AC transmission, Voltage gradients of conductors,  
effects of Corona, Travelling waves, calculation of electrostatic field of EHVAC lines and  
Voltage control.

Course Outcomes:
CO 1. Students are able to understand the basics of EHV AC transmission systems,  
Electrostatics and potential relations in conductors, Surface voltage gradient on  
conductors Effects of Corona and Travelling waves, Understand Electrostatic fields and  
Voltage control.

UNIT I:
Voltage gradients of conductors: Necessity of EHV AC transmission- advantages and  
problems - power handling capacity and line losses mechanical considerations- resistance of  
conductors - properties of bundled conductors - bundle spacing and bundle radius - Examples.  
Electrostatics - field of sphere gap- field of line changes and properties-charge - potential  
relations for multi - conductors - surface voltage gradient on conductors - distribution of voltage  
gradient on sub conductors of bundle - Examples.

UNIT II:
Corona effects: Power loss and audible noise (AN) - corona loss formulae - charge voltage  
diagram- generation, characteristics - limits and measurements of AN-relation between I-phase  
and 3-pahse AN levels- Examples. Radio interference (RI) - corona pulses generation, properties.

UNIT III:
Basic Concepts of DC Transmission: Economics & Terminal equipment of HVDC  
transmission systems: Types of HVDC Links- Apparatus required for VDC Systems-  
Comparison of AC&DC Transmission, Application of DC Transmission System - Planning &  
Modern trends in D. C. Transmission.
UNIT IV:
**Analysis of HVDC Converters and System control:** Choice of Converter configuration - analysis of Graetz - characteristics of 6 Pulse & 12 Pulse converters – Cases of two 3 phase converters in star-star mode - their performance, Principal of DC Link Control – Converters Control Characteristics - Firing angle control - Current and extinction angle control - Effect of Source inductance on the systems; Starting and stopping of DC link; Power Control.

UNIT V:
**Reactive Power Control in HVDC Transmission:** Reactive Power Requirements in steady state - Conventional control strategies - Alternate control strategies sources of reactive power

**Harmonics and Filters**

**TEXT BOOKS:**
1. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (P) Ltd.
2. HVDC Transmission - J. Arrillaga.

**REFERENCE BOOKS:**
2. EHVAC and HVDC Transmission Engineering and Practice - S. Rao.
POWER SYSTEMS LAB

Subject Code: 13EE3109
Credits: 2

Internal Marks: 25
External Marks: 50

Course Objective:
- To understand the various properties of Transmission lines to study the various concepts of protection in the Transmission lines.

Course Outcomes:
CO 1. The graduate will be able to use the state-of-the-art tools for modeling, simulation and analysis of problems related to power systems.

LIST OF EXPERIMENTS:
1. Identification of fault location in underground cable using Varley loop test.
2. Characteristics of micro controller based over current relay.
3. V-I characteristics of PV solar panel.
4. Observation of the FERRANTI EFFECT using high voltage transmission line analyzer.
5. Determination of transmission line parameters (ABCD parameters) using high voltage transmission line analyzer.
6. Characteristics of normal FUSE and MCB.
7. Shunt capacitor compensation (improvement of receiving end voltage and power factor).
8. Study of BUCHHOLZ RELAY for major and minor faults.
9. Study of over current relay for different load conditions.
10. Shunt reactor compensation.
POWER ELECTRONICS LAB

Subject Code: 13EE3110
Credits: 2

Course Objective:

- To develop hands on experience with principle and working of thyristors. To study various types of power electronic converters.

Course Outcomes:

CO 1. The students can analyze how the thyristors can work along with their characteristics, analysis of half controlled and fully controlled converters, choppers, cyclo-converters, ac voltage controllers, inverters and the firing circuits of SCRs.

LIST OF EXPERIMENTS:

(Any 10 of the following Experiments are to be conducted)

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits of SCR’s
4. Single Phase half Controlled converter with R and RL load
5. Single Phase fully controlled bridge converter with R and RL loads
6. Single Phase AC Voltage Controller with R and RL loads
7. Single Phase Cyclo-converter with R and RL loads
8. Single Phase bridge inverter with R and RL loads
9. Single Phase series inverter with R and RL loads
10. Single Phase Parallel, inverter with R and RL loads.
11. Single Phase dual converter with RL loads
12. Three Phase half controlled bridge converter with RL-Load
13. Chopper Controlled DC Motor
INDUSTRIAL AUTOMATION LAB

Subject Code: 13EE3111 Internal Marks: 25
Credits: 3 External Marks: 50

List of Experiments:
1. Study of PLC and Ladder logic/
2. Study of development of ladder logic for Boolean logic design.
3. Study of Latches, Timers and Counters.
4. Study of SCADA monitoring.
5. Switch on light/off light for logic gates *AND, NOR, NAND, NOR, NOT, XOR, HALF, ADDER, FULL ADDER) by using Ledder Logic and SCADA monitoring.
6. Switch on light/off light with timers (on Delay and Off Delay) by using Ladder logic and SCADA monitoring.
7. Switch on light/off light with counters (up & down) using ladder logic and SCADA monitoring.
8. Switch on light/off light with timers and counters by using ladder logic and SCADA monitoring.
9. Switch on light/off with timers and switch on light/off light with counter by using Ladder latching logic and SCADA monitoring.
10. Write small ladder logic programs for traffic signal control and controlled by SCADA.
11. To study the variable frequency drive based 3phase induction motor operation by key pad.
12. To study the variable 3phase induction motor operation by using PLC and SCASDA.
SELF STUDY COURSE-II

Subject Code: 13EE3202  
Credits: 1

Internal Marks: 75

External Marks: --

Course Objectives:

- Identify sources of information.
- Collecting relevant information.
- Ability to interpret information
- Ability to move from problem to solution.

Course Outcomes:

CO 1. Acquires ability to locate sources of information.
CO 2. Acquires ability to filter and select relevant information
CO 3. Apply information to real world problems and solve them.

Content:

- Data collection through Internet
- Data collection from Library and other sources
- Seminar/ Presentation
- Group discussion

On Identified topics, Current trends and emerging technologies like Modeling and simulation of different Electrical Engineering systems.
POWERS SEMI CONDUCTOR DRIVES

Subject Code: 13EE4022
Credits: 3

Course objective

This course enables the students to:

- Understand the fundamentals of different motors and power electronic circuits for employing both DC and AC drives.
- Understand performance of converter fed DC drive system.
- Learn various control methods of voltage source and current source inverter fed induction motor drive system.
- Understand the different techniques used in speed control of synchronous motors.
- Learn the operating characteristics of dual converter and AC voltage controller fed electrical drives.
- Understand the selection of appropriate drive for an industrial application.

Course outcomes

Upon completion of this course the students are able to:

CO1: Analyze speed control of electrical drives using 1Ø & 3Ø converters for different applications

CO2: Detect various Electrical braking methods & control techniques of electrical drives for industrial applications

CO3: Design power electronic circuits using choppers to control the electrical drives.

CO4: Understand the performance characteristics of converter fed DC motors to justify their applications

CO5: Apply the knowledge of control theory to induction and synchronous motor drives

UNIT I:
Control Of DC Motors By Single Phase & Three Phase Converters: Introduction to Thyristor controlled Drives, Single Phase semi and Fully controlled converters connected to d.c separately excited and d.c series motors – continuous current operation – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics.

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.
UNIT II:
**Electrical braking chopper fed drives:** Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative braking operations. Four quadrant operation of DC motors by dual converters – Closed loop operation of DC motor.

UNIT III:
**Chopper fed dc drives:** Single, Two and four quadrants chopper fed dc separately excited and series excited motors – Continuous current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics, Closed Loop Operation.

UNIT IV:
**Control of induction motor from stator side:** Variable voltage characteristics-Control of Induction Motor by AC Voltage Controllers-speed torque characteristics.

Control of Induction Motor through Stator Frequency-Variable frequency characteristics-Variable frequency control of induction motor by Voltage source and current source inverters- PWM control – Comparison of VSI and CSI operations – Speed torque characteristics, closed loop operation of induction motor drives.

UNIT V:
**Control of induction motor from rotor side and synchronous motors:** Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages applications Separate control &self control of synchronous motors – Closed loop operation of synchronous motor drives – Applications – Advantages.

TEXT BOOKS:


REFERENCE BOOKS:

POWER SYSTEM ANALYSIS

Subject Code: 13EE4023  Internal Marks: 30
Credits: 3  External Marks: 70

Course objective
This course provides the basic concepts on load flow that enables the students to gain comprehensive knowledge on analysis of a power system thereby construct the mathematical model of a given power system, analyze the behavior of power system under abnormal conditions and check whether the system is within stable limits.

Course outcomes
At the end of the course student would be able to:

CO1: Compute the per unit system
CO2: Calculate the load flows in a power system using various techniques.
CO3: Compute Zbus for a given power system network.
CO4: Solve an un-balanced three phase network by using symmetrical components and
      Analyze a power system under fault conditions.
CO5: Analyze the transient and steady state stabilities.

UNIT I
Per Unit System: Single line diagram – per phase and per unit representation – change the base.


UNIT II
UNIT –III
Z-Bus Formation: Simple building algorithms for the formation of Zbus matrix (without mutual coupling).


UNIT –IV
Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems.

UNIT –V
Stability Analysis: Elementary concepts of Steady State, Dynamic and Transient Stabilities.

TEXT BOOKS:

REFERENCES:
2. Company, 1994
POWERSYSTEM OPERATION AND CONTROL

Subject Code: 13EE4024
Credits: 3
Internal Marks: 30
External Marks: 70

Course objective

- Learn the characteristics of generation unit/output curves and study the optimal allocation of total load among the generation units without and with transmission losses.
- To develop the mathematical modeling of long range hydro thermal scheduling and to study the kirchmayer’s method for short term hydro thermal co-ordination.
- Learn how generating units are committed to meet load over the hours of a week using dynamic programming.
- It emphasizes on single area and two area load frequency control.
- To understand about Reactive power control and the methods of compensation.

Course outcomes

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

CO1: Explain how the optimal allocation of total load among the generation units is done with and without losses.

CO2: Solve Unit commitment problem using dynamic programming technique for a given power system.

CO3: Analyze the load frequency control (LFC) and have knowledge on knowledge on steady state and dynamic analysis of single area power system with and without integral control.

CO4: Design the block diagram model for a two area power system.

CO5: Explain Reactive power control and the methods of reactive power compensation techniques.

UNIT I:


UNIT II:


Unit commitment: Optimal unit commitment problem – Need for unit commitment – constraints in unit commitment – cost function formulation - solution methods – dynamic programming.
UNIT III:
**Single Area Load Frequency control:** Modeling of steam turbine, generator, mathematical modeling of speed governing system – Transfer function, modeling of Hydro turbine, 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. Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency Control and Economic dispatch control

UNIT IV:
**Two – Area Load Frequency Control:** Load frequency control of two area system – uncontrolled case and controlled case, tie - line bias control

UNIT V:
**Reactive Power Control:** Overview of Reactive Power controls – 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, introduction to flexible alternating current transmission systems (FACTS).

**TEXT BOOKS:**
1. Power System stability & control, PrabhaKundur

**REFERENCE BOOKS:**
1. Power System Analysis and Design by J. Duncan Glover and M. S. Sarma, THOMPSON, 3rd edition
MICROPROCESSORS AND MICROCONTROLLERS

Subject Code: 13EC4019  
Credits: 3  
Internal Marks: 30  
External Marks: 70

Course objective

- Study the components of the computers (CPU, Registers, Stack, etc) microprocessors and microcontrollers and learning addressing modes, instruction set, assembler directives of 8086.
- Understand the concepts of assembly language program with an assembler and understand stack structure, interrupts of 8086.
- Understand the concept of interfacing devices.
- Study the architectural view of 8051 micro controller.

Course outcomes

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

- CO1: Recognize and interpret the microprocessor and microcontroller based system.
- CO2: Write assembly language programs using 8086 processor.
- CO3: Understand the concepts of advanced micro process i.e. 80386, 80486.
- CO4: Know the concepts of interfacing devices.
- CO5: Understand the basics of 8051 micro controller.

UNIT I:  
Microprocessor 8086: Introduction, architecture, register organization, memory organization, signal description and pin diagram, addressing modes, assembler directives, procedures, macros and timing diagrams of 8086.

UNIT II:  
Assembly Language Programming of 8086: Instruction set, assembly language programs, introduction to stack, stack structure, classification of interrupts, interrupt service routine and interrupt vector table.

UNIT III:  
Advanced microprocessors: Architecture Features, register organization, signal description, data types and physical address calculation, mode of operations, segmentation and paging of 80386. Introduction to 80486.
UNIT IV:
Interfacing with 8086: Programmable interrupt controller (8259A) – Programmable Peripheral Interface (8255), modes of operation of 8255 – DMA controller (8257) – Keyboard/display controller (8279) – Programmable communication interface (USART) (8251).

UNIT V:
Microcontrollers: Introduction, architecture, signal description, pin diagram, register set, memory organization, parallel I/O ports, interrupts and addressing modes of 8051. Introduction to PIC microcontrollers

Text books:

Reference books:
HIGH VOLTAGE ENGINEERING
(Elective-II)

Subject Code: 13EE4025  Internal Marks: 30
Credits: 3  External Marks: 70

Course objective

- To develop knowledge on generation and measurement of high voltage DC, AC (power frequency and high frequency), impulse voltages and currents.
- To understand thoroughly various high voltage testing techniques of power apparatus and Insulation coordination in power systems.
- To understand various numerical methods for field calculations.

Course outcomes

Students are able to

**CO1: Read** the terms and numerical methods used in High Voltage Technology.
**CO2: Discuss** different breakdown mechanisms in dielectrics.
**CO3: Analyze** the concept of Generation of High Voltage, High Current and Impulses.
**CO4: Read** the techniques employed in High Voltage Measurements.
**CO5: Generalize** with non-distractive test techniques in High Voltage Engineering.

UNIT I:
**Introduction to High Voltage Technology:** Electric Field Stresses, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control.

UNIT II:
**Break down phenomenon in gaseous, liquid and solid dielectrics:** Gaseous 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. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.
UNIT III:

UNIT IV:

UNIT V:
**Industrial Application to High Voltage Engineering:** Electro Static applications- Electro static precipitator, Electro static separator, Electro static coating, Electro Static copying, pulsed power.

**TEXTBOOKS:**

**REFERENCE BOOKS:**
ELECTRICAL MACHINE DESIGN
(Non-elective-II)

Subject Code: 13EE4026
Credits: 3

Course objective

1. To understand and appreciate the design aspects of various electrical machines.
2. Acquire knowledge of armature winding design for both DC and AC rotating electrical machines.
3. To study the design of transformers, DC machines, induction machines and synchronous machines.

Course outcomes

Upon successful completion of this course, students will:

CO1: Be able to estimate number of conductors, slots, conductor dimension and slot dimension for DC machine based on given specifications.
CO2: Be able to design field system, interpoles of a DC machine
CO3: Learn how to calculate the cross section of core and yoke, number of cooling tubes, resistance, leakage reactance, losses and efficiency of a transformer.
CO4: Learn how to design stator and rotors for squirrel cage and wound rotor induction motors
CO5: Be able to explain the effect of Short-circuit ratio on synchronous machine performance

UNIT I:
Introduction to Electrical Machine Design, Armature Winding (DC & AC):

UNIT II:
DC Machines
UNIT III:
Transformers: Construction –Comparison of Core and Shell Type, Single and Three Phase Transformer Comparison. Coreand Yoke Design-Cross Section, Number of Cooling Tubes. Transformer Windings, Coil Design, Output Equation, Determination of Number of Turns.

UNIT IV:

UNIT V:

TEXT BOOKS:
2. Electrical machine design by Nagoorkani.

REFERENCE BOOKS:
2. “Performance and Design of DC Mchines” Clayton &Hancock,ELBS.
3. “Performance and Design of AC Mchines”, M.G.Say; Pitman,ELBS.
ARTIFICIAL NEURAL NETWORKS AND FUZZY LOGIC
(Elective-II)

Subject Code: 13EE4027  
Credits: 3  
Internal Marks: 30  
External Marks: 70

Course objective
- To cater the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.
- Basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.

Course outcomes
CO1: To expose the students to the concepts of feed forward neural networks.
CO2: To provide adequate knowledge about feedback neural networks.
CO3: To teach about the concept of fuzziness involved in various systems. To provide adequate knowledge about fuzzy set theory.
CO4: To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
CO5: To provide adequate knowledge of application of fuzzy logic control to real timesystems

UNIT I:

UNIT II:

UNIT III:
UNIT IV:

UNIT V:
Basic structure and operation of Fuzzy logic control systems: Design methodology and stability analysis of fuzzy control systems; Applications of Fuzzy controllers. Applications of fuzzy theory.

Text Books:
1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.

Reference:
3. Neural Networks – Simon Hakins, Pearson Education
4. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
DATABASE MANAGEMENT SYSTEMS  
(Elective-II)

Subject Code: 13EE4028  
Internal Marks: 30
Credits: 3  
External Marks: 70

Course objective
- To introduce basic RDBMS concepts, SQL, Database design and query processing and also to introduce transaction processing, issue and techniques relating to concurrency and recovery in multi-user database environments, and various Data structures for External Data storage and efficient retrieval.

Course outcomes
Students will be able to
- CO2: Interpret, Design and Implement an E-R Model.
- CO3: Create/Modify the structure and write optimized SQL Queries to extract and modify information from Tables or Views.
- CO4: Apply proper Techniques such as Normalization and analyze the applicability of a specific normal form in designing a Database.
- CO5: Compare various indexing, Hashing and File Organization Techniques.
- CO6: Explain broad range of database management issues including data integrity, Concurrency recovery and security.

UNIT I:

UNIT II:
History of Data base Systems. Data base design and ER diagrams – Beyond ER Design - Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

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UNIT III:
Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity’s – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT IV:

UNIT V:

TEXT BOOKS:

REFERENCE BOOKS:
1. https://www.coursera.org/course/db
3. Fundamentals of Database Systems, ElmasriNavrate Pearson Education
4. Introduction to Database Systems, C.J.Date Pearson Education
AIR QUALITY MANAGEMENT
(Open Elective)

Subject Code: 13OE4001 Internal Marks: 30
Credits: 3 External Marks: 70

Course objective

- To identify different pollutants which are causing air pollution.
- To understand the thermodynamics and kinetics of air pollution.
- To apply the professional knowledge of air pollution to design pollution control systems.
- To aim for employment in pollution control organizations.
- To apply the professional, ethics, attitude, team work skills, multi disciplinary approach to contribute the needs of society in the field of environmental protection.

Course outcomes

CO1: Able to solve air pollution problems of industries.
CO2: Able to create awareness among the public on the effects of air pollution at local level as well as global level.
CO3: Able to manage the ambient air quality by maintaining emission standards.
CO4: Able to get successful employment in organizations working for the protection of environmental.
CO5: Able to design air pollution control equipments for industries and other polluting sources.

UNIT I:
Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Measurement of Pollution Classifications – Natural and Artificial –Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources.

UNIT – II:
Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, and Ozone Holes-Effects of art treasures.

UNIT III:
UNIT IV:
General Methods of Control of NO$_2$ and SO$_2$ emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

UNIT V:
Ambient Air Quality Management – Monitoring of SPM, SO; NO and CO Stack Monitoring for the Flue gases – Micro meterological monitoring Emission Standards.

TEXT BOOKS:
2. Air pollution and control by KVSG Murali Krishna.

REFERENCES:
CYBER LAWS
(Open elective)

Subject Code: 13OE4002
Credits: 3
Internal Marks: 30
External Marks: 70

Course Objective
- To identify the emerging Cyber law trends
- To create more awareness about the newly emerging kinds of cybercrimes
- To identify the areas in cyber crimes where Cyber law needs to be further evolved
- To identify the impact of Cyber Law on Real World
- To identify the importance of cyber law and its professionals.

Course Outcomes

CO1: Have comprehensive information about security policies, establishing necessary organizational processes /functions for information security and will be able to arrange necessary resources.
CO2: Understand, analyze and work on activities of fraud prevention, monitoring, investigation, reporting.
CO3: Differentiate among the models, architectures, challenges and global legal constraints of secure electronic commerce technologies used to ensure transmission, processing and storage of sensitive information.
CO4: Have knowledge of cyber law and ethics.
CO5: Evaluate the interaction and relative impact of human factors, processes and technology in cyber law infrastructures.

UNIT I:
The IT Act, 2000: A Critique: Crimes in this Millennium, Section 80 of the IT Act, 2000 – A Weapon or a Farce?, Forgetting the Line between Cognizable and Non- Cognizable Officers, Arrest for “About to Commit” an Offence Under the IT Act, A Tribute to Darco, Arrest, But No Punishment.

UNIT II:
Cyber Crime and Criminal Justice: Penalties, Adjudication and Appeals Under the IT Act, 2000: Concept of Cyber Crime and the IT Act, 2000, Hacking, Teenage Web Vandals, Cyber fraud and Cyber Cheating, Virus on Internet Deformation, Harassment and E-mail Abuse
UNIT III:

UNIT IV:

UNIT V:
Protection of Cyber Consumers in India: Are Cyber Consumers Covered under the Consumer Protection, Goods and Services, Consumer Complaint, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices

Text Books:
2. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections

Reference Books:
2. Cyber Law in India by Farooq Ahmad – Pioneer Books
5. The Information Technology Act,2000 – Bare Act – Professional Book Publishers – New Delhi
ENTREPRENEURIAL DEVELOPMENT
(Open elective)

Subject Code: 13OE4003
Credits: 3

Internal Marks: 30
External Marks: 70

Course objective

The objective of this course is to expose the students to the subject of entrepreneurial development, so as to prepare them to establish a new enterprise and effectively manage the enterprise.

Course outcomes

CO1: Understand the concept of Entrepreneurship and demonstrate the ability to provide a self analysis on Entrepreneurship qualities in the context of an Entrepreneurial career.
CO2: Understanding Entrepreneurship Development programmes in India and contents for training for Entrepreneurial competencies.
CO3: Create appropriate business model and develop well presented business plan that is feasible for the student.
CO4: Understanding how to manage effectively the selected business.

UNIT I:

UNIT II:
Entrepreneurship Development in India: Nature and development of Entrepreneurship in India - emergence of entrepreneurial class in India, Environmental factors effecting entrepreneurship, local mobility of Entrepreneurs, development of women Entrepreneurship, problems and remedies of women Entrepreneurship. Entrepreneurship Development programme (EDP) - need and objectives of EDPs, Designing Appropriate training programme to include course contents, phases and evaluation of EDPs for existing and new entrepreneurs. Institutions supporting for EDP - NIESBUD, EDII, NAYE, TCOs, MSMEDI, DICs, commercial Banks, Universities and Engineering colleges.
UNIT III:
Creating and starting the venture: Types of start ups. Steps to start an MSME. Meaning of a project. Project Identification- Sources of new Ideas, methods of generating ideas, creative problem solving, and opportunity recognition. Project selection - meaning of project report (Business Plan), Formulation of a project report, project appraisal by economic analysis, financial Analysis, market analysis, technical Feasibility, managerial competence. Project implementation. Preparation of sample project report of any one product and service.

UNIT IV:

UNIT V:

Text Books:
1. H.Nandan: Fundamentals of Entrepreneurship, PHI Learning, New Delhi, 2009
3. Dr.C.B.Gupta and Dr.S.S.Khanka Entrepreneurship and Small Business Management: Sultan Chand & Sons:,2010

References:
2. Hisrich: Entrepreneurship, TMH, New Delhi,2009
INDUSTRIAL SAFETY AND ENVIRONMENT  
(Open elective)

Subject Code: 13OE4004  
Internal Marks: 30
Credits: 3  
External Marks: 70

Course Objectives:
- To familiarize the student with fundamentals principals of safety management
- To impart knowledge on different type of industrial hazards
- To enable the student to know the various industrial safety acts
- To understand the environmental safety

Course Out comes:

CO1: Attain the basic fundamentals safety management
CO2: Understand the safety various industrial safety acts
CO3: Acquire basic knowledge of different type of industrial hazards
CO4: Understand the concepts of environmental safety

UNIT I:

UNIT II:
Environmental safety:
Air pollution, water pollution, hazardous waste management, environmental measurement and control, pollution control in process industries

UNIT III:
Occupational health and industrial hygiene; physical hazards, chemical hazards, biological and ergonomical hazards, occupational physiology

UNIT IV:
Industrial safety, health and environment acts; factories act– 1948, environment act– 1986, manufacture, storage and import of hazardous chemical rules 1989
UNIT V:
International acts and standards, other acts and rules (indian boiler act 1923, static and mobile pressure vessel rules (smpv), motor vehicle rules)

Text books:

References:
MICRO ELECTRO MECHANICAL SYSTEMS
(Open elective)

Subject Code: 13OE4005 Internal Marks: 30
Credits: 3 External Marks: 70

Course objective
- To understand various MEMS fabrications processes including additive, subtractive, patterning, material modification processes and mechanical steps.
- To understand workings of MEMS mechanical and thermal sensors and actuators
- To understand mechanisms of MEMS magnetic sensors and actuators and Microfluidic devices
- To understand mechanisms of MEMS optical and RF devices.
- To be exposed to MEMS simulation softwares, Multiscale simulations, CNT and NEMS.

Course outcomes
On completion of this course, students should be able

CO1: To understand various MEMS fabrications processes including additive, subtractive, patterning, material modification processes and mechanical steps.
CO2: To understand workings of MEMS mechanical and thermal sensors and actuators
CO3: To understand mechanisms of MEMS magnetic sensors and actuators and Microfluidic devices
CO4: To understand mechanisms of MEMS optical and RF devices.
CO5: To be exposed to MEMS simulation softwares, Multiscale simulations, CNT and NEMS.

UNIT I:

UNIT II:

**UNIT III:**

**Magnetic sensors and actuators:** Magnetic properties of materials, Presence and detection of large objects, Magneto-restrictive sensor, Hall effect sensor, Magneto-diode, Magneto-transistor, MEMS magnetic sensor, Pressure sensor utilizing MOKE, MagMEMS actuators, Optical switches, Bi-directional micro-actuator, Feedback circuit integrated magnetic actuator, Large force reluctance actuator, Magnetic probe based storage device.


**UNIT IV:**


**RF MEMS:** Introduction to RF Communication and RF MEMS, MEMS inductors, Varactors, Tuner/filter, Resonator, MEMS switches, Phase shifter.

**UNIT V:**

**MEMS Simulations:** Atomistic to Continuum theory, Multiscale concept, Multiscale methods. Softwares - Ansoft Designer, HFSS, DS/MEMS and CA/MEMS, FEMPRO, ANSYS Multiphysics, SUGAR.

**NEMS:** Nanotechnology Materials, Carbon Nanotubes (CNT) – Development, Applications, Properties, Molecular Machine Components, Introduction to NEMS.

**TEXT BOOKS:**


**REFERENCES:**


OPTIMIZATION TECHNIQUES
(Open elective)

Subject Code: 13OE4006
Credits: 3

Course Objectives:
- To be able to formulate linear or nonlinear optimization problems as a solution for industrial problems.
- To be able to solve various kinds linear and nonlinear, single and multiple variable, unconstrained and constrained optimization problems using standard optimization algorithms.

Course Outcomes:
CO1: Should be able to solve linear multivariable optimization using linear programming and perform sensitivity analysis.
CO2: Should be able to solve single-variable, non-linear, unconstrained optimization problems
CO3: Should be able to solve geometric programming optimization problems using standard techniques for each case.

UNIT I:
Introduction to Classical Optimization Techniques: Single variable optimization with and without constraints, multi-variable optimization without constraints, multi-variable optimization with constraints – method of Lagrange multipliers, Kuhn-Tucker conditions

UNIT II:
Linear programming: Two-phase simplex method, Big-M method, duality, interpretation, applications

UNIT III:
Assignment problem: Hungarian’s algorithm, Degeneracy, applications, unbalanced problems, traveling salesman problem.

UNIT IV:
One dimensional Optimization methods: Elimination Methods: - Fibonacci, Golden Section.
Interpolation Methods: - Quadratic, Cubic.
Direct Root Methods: - Newton, Quasi-Newton, Secant Methods. Gradient of a function, steepest descent method.
UNIT V:
GEOMETRIC PROGRAMMING: Polynomials – arithmetic - geometric inequality –
unconstrained G.P- constrained G.P

Text Books:
2. Optimization for Engineering Design – Kalyanmoy Deb, PHI Publishers

References:
2. Engineering Optimization, A Ravindran, K M Ragsdell, G V Reklaitis
RENEWABLE ENERGY
(Open elective)

Subject Code: 13OE4007
Credits: 3

Internal Marks: 30
External Marks: 70

Course objective:

- To Outline the concept regarding the physics of the sun
- To Outline the concept regarding the collection of solar energy and storage of solar energy
- To Outline the concept regarding different types of wind mills and different types of biogas digesters
- To Outline the concept regarding geothermal energy conversion
- To Outline the concept regarding direct energy conversion

Course outcomes:

After completion of this course the student can able to

CO1: Define different kind of solar radiation
CO2: Utilize different methods of collection of solar energy and storage of solar energy
CO3: Classify different types of wind mills and biogas digesters
CO4: Classify different types of geothermal energy sources and utilize different types of extracting techniques
CO5: Distinguish different kinds of direct energy conversion techniques

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

UNIT-II
SOLAR ENERGY COLLECTION, STORAGE AND APPLICATIONS
Flat plate and concentrating collectors, classification of concentrating collectors, orientation, advanced collectors. Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.
UNIT-III
WIND AND BIOMASS ENERGY:

UNIT-IV
GEOTHERMAL AND OCEAN ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India. OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V
DIRECT ENERGY CONVERSION:
Need for DEC, Carnot cycle, limitations, principles of DEC. Thermoelectric generators, seebeck, peltier and joul Thomson effects, MHD generators, principles, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion. Fuel cells, principles, faraday’s law’s, selection of fuels and operating conditions.

TEXT BOOKS:
1. Non-Conventional Energy Sources /G.D. Rai
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa

REFERENCE BOOKS:
1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
4. Solar Energy /Sukathme
ADVANCED MATERIALS
(Open elective)

Subject Code: 13OE4008  Internal Marks: 30
Credits: 3  External Marks: 70

Course objective
- To know different types of composite materials.
- To learn different manufacturing methods of the composite materials.
- Distinguish between the properties and uses of different reinforcement fibers.
- Explain the principles, types and applications of different functionally graded materials and shape memory alloys.
- To know about the nonmaterial and nanotechnology.

Course outcomes
At the end of the course students are able to:

CO1: Understand the need and explain different types of composite materials.
CO2: Summarize the various methods for manufacturing of the composite materials.
CO3: Distinguish between the properties and uses of different reinforcement fibers.
CO4: Explain the principles, types and applications of different functionally graded materials and shape memory alloys.
CO5: Outline the evolution, history, applications and impact of nanotechnology.

UNIT I:

Manufacturing Methods: Autoclave, tape production, moulding methods, filament winding, manual layup, pultrusion, RTM.

UNIT II:
Metal Matrix and Ceramic Matrix Composites: Manufacturing of ceramic matrix & metal matrix composites and their applications, stress strain relations for MMC and CMC.
UNIT III:
Smart materials: Shape memory alloys, Piezoelectric materials, Electro-rheological fluid, Magneto- rheological fluid

UNIT IV:
Biomaterials: Property requirement, Concept of biocompatibility, Cell-material interaction and body response to foreign materials, Important biometallic alloys, Ni-Ti alloy, Co-Cr-Mo alloys

UNIT V:
Nano materials & technology: Definition, Types of nonmaterial including carbon nanotubes and nanocomposites, Methods for creating nano structures, Processes for producing ultrafine powders - physical synthesis and chemical synthesis, Physical and mechanical properties and their applications

TEXTBOOKS:
1. Nano material by A.K. Bandyopadyay, New age 'publishers
2. Material science and Technology- Cahan

REFERENCE BOOKS:
TOTAL QUALITY MANAGEMENT
(Open elective)

Subject Code: 13OE4009
Credits: 3

Internal Marks: 30
External Marks: 70

Course objective:

• To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.
• To understand the statistical approach for quality control.
• To create an awareness about the ISO and QS certification process and its need for the industries.

Course outcomes:

CO1: Develop an understanding on quality management philosophies and frameworks.
CO2: Understand the fundamental principles of total quality management.
CO3: Choose approximate statistical techniques for improving processes.
CO4: Develop in-depth knowledge on various tools and techniques of quality management.
CO5: Know what cultural transformation is necessary for successful implementation of total quality practices with his/her organization.

UNIT I:

UNIT II:
UNIT III:

UNIT IV:
**Tools And Techniques for Quality Management:** Quality functions development (QFD) – Benefits, Voice of customer, information organization, House of quality (HOQ), building a HOQ, QFD process. Failure mode effect analysis (FMEA) – requirements of reliability, failure rate, FMEA stages, design, process and documentation. Seven old (statistical) tools. Seven new management tools. Benchmarking and POKA YOKE.

UNIT V:

**Text Books:**

**References:**
MICROPROCESSORS AND MICROCONTROLLER LAB

Subject Code: 13EC4109  Internal Marks: 25
Credits: 2          External Marks: 50

List of Experiments (At least ten experiments are to be done):

I. Microprocessor 8086
1. Introduction to MASM/TASM.
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division
   – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to
   ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting,
   Inserting, Deleting, Length of the string, String comparison.
5. DOS/BIOS programming: Reading keyboard (Buffered with and without echo) – Display
   characters, Strings.

II. Microcontroller 8051
1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.

III. Interfacing
1. 8259 – Interrupt controller: Generate an interrupt using 8259 timer.
2. 8279 – Keyboard display: Write a small program to display a string of characters.
3. 8255 – PPI: Write ALP to generate sinusoidal wave using PPI.
4. 8251 – USART: Write a program in ALP to establish Communication between two
   processors.
ELECTRICAL SIMULATION LAB WITH SIMULINK

Subject Code: 13EE4112 Internal Marks: 25
Credits: 3 External Marks: 50

Course objective:

- To enable the students gain sufficient knowledge on the programming and simulation electrical circuits, power electronics, control systems and power systems.

Course outcomes:

CO1: Students should be able to analyze the analytical and practical details of a range of modeling techniques.

CO2: Students should be able to select the modeling blocks for modeling of any dynamic systems.

CO3: Students should be able to explain each and every modeling blocks in either PSPICE or MATLAB.

CO4: Students should be able to give practical experience with simulating physical systems and modeling typical experimental data for example second order circuits, non-linear circuits, Electrical machines, Power systems, Control systems and Network simulation.

CO5: Students should be able to carefully and thoroughly document and analyze experimental work.

List of experiments:

1) Analysis of three phase circuit representing the generator, transmission line and load. Plot three phase currents and neutral current using PSPICE.

2) PSPICE Simulation of Transient Response of RLC Circuits
   a) Response to pulse input.
   b) Response to step input.
   c) Response to sinusoidal input.

3) PSPICE Simulation of Single phase full converter using RL & E load with and without free wheeling diode.

4) PSPICE Simulation of Three phase full converter using RL & E Load.

5) PSPICE Simulation of single phase AC Voltage controller using RL load.

6) Modeling of transformer and simulation of transmission line using PSPICE
7) Simulation of single phase inverter with sinusoidal pulse modulation control using MATLAB/SIMULINK
8) Simulation of capacitor start-run single phase induction motor using MATLAB/SIMULINK.
9) Power flow solution of given power system network by using Gauss-siedel Method.
10) Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
11) Development and Simulation of 3-phase PWM Inverter with sinusoidal pulse-width modulation using MATLAB/SIMULINK
12) Simulation of Resonant pulse commutation circuit and buck chopper using MATLAB/SIMULINK
UTILIZATION OF ELECTRICAL ENERGY

Subject Code: 13EE4029
Credits: 3

Course objective:
- To study electric drive characteristics and understand various factors affecting the choice of motor.
- To study electrical heating and electrical welding and appreciate their merits over other methods.
- To learn the fundamentals of illumination and various illumination methods.
- To understand system of electrical traction and mechanics of train movement.

Course outcomes:
Upon successful completion of this course, students will:
- CO1: Be able to select an appropriate motor for given application.
- CO2: Gain insight into different electrical heating and welding techniques.
- CO3: Be able to understand basic principles of light control and design lighting schemes.
- CO4: Be able to differentiate existing electric traction system in India.
- CO5: Acquire knowledge to calculate tractive effort, power, specific energy consumption for given run.

UNIT I:
Selection of Motors and Demand Side Management: Type of electric drives, choice of motor, starting and running characteristics, temperature rise, particular applications of electric drives, continuous, intermittent and variable loads, load equalization. Energy star rating of equipment, Demand side management (energy efficiency techniques, demand response)

UNIT II:
Electric Heating: Advantages and methods of electric heating, resistance heating, induction heating and dielectric heating.

Welding: Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.
UNIT III:
**Illumination:** Introduction, terms used in illumination, laws of illumination, Polar curve, Discharge lamps, MV and SV lamps – comparison between tungsten filament lamps and fluorescent tubes, stroboscopic effect, Basic principles of light control, Types and design of lighting and floodlighting, LED lighting.

UNIT IV:
**Electric Traction– I:** System of electric traction and track electrification. Review of existing electric traction systems in India, 25 kV AC traction system and its advantages, Special features of traction motor, Mechanics of train movement. Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

UNIT V:
**Electric Traction– II:** Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion.

TEXT BOOKS:
2. Utilization of Electric Power and Electric Traction - by J B Gupta, S K Kataria & Sons

REFERENCE BOOKS:
DIGITAL CONTROL SYSTEMS
(Elective-III)

Subject Code: 13EE4030
Credits: 3
Internal Marks: 30
External Marks: 70

Course objective

- Summarize different types of signals.
- Computing the Z-transforms and inverse Z transforms.
- Developing state model and stability analysis of digital control systems.
- Testing controllability and observability in state space analysis.
- Design of discrete time control system by conventional methods.

Course outcomes

CO1: Students can summarize different types of signals.
CO2: Students can operate the Z-transforms and inverse Z transforms.
CO3: Students can develop state model and stability analysis of digital control systems.
CO4: Students can test controllability and observability in state space analysis.
CO5: Students can design discrete time control system by conventional methods.

UNIT I:

UNIT II:
Z transforms & Applications: Review of Z transforms, Mapping between S-plane and Z-plane, inverse Z-transform, Limitations of the Z-transform, Applications of Z transforms, pulse-transfer function, pulse transfer function of the zero-order hold.

UNIT III:
UNIT IV:
State equations – 2: Relation between state equation and transfer function, computing the state transition matrix by the Z-transform method. Relation between state equations and high order difference equations via canonical form, Analysis of the state diagrams of the Sampled Data Control Systems.

UNIT V:

Text Books:

Reference Books:
ADVANCED CONTROL SYSTEMS
(Elective-III)

Subject Code: 13EE4031  
Credits: 3

Course objective
- Solve state equation and test for controllability and observability
- Design pole placement
- Estimate stability for non linear systems
- Understood Adaptive control functions
- Understood different optimal control problems

Course outcomes
At the end of the course student can be able to:

CO1: Compute solution of state equation and estimate the controllability and observability
CO2: Design the observers for pole placement
CO3: Apply liapunov theory and analyze the stability
CO4: Associate the functions of adaptive control with their applications
CO5: Distinguish the optimal control problems

UNIT I:
State Space Analysis: State space representation, solution of state equation, state transition matrix and its properties, concepts of controllability and observability, test for controllability and observability by Gilberts and Kalman test

UNIT II:
Modern Control: Effect of state feedback on controllability and observability, Pole placement by state feedback, Full order observer and reduced order observer

UNIT III:
UNIT IV:
Adaptive Control: Definition of adaptive control system, functions of adaptive control, gain scheduling, model reference, series and parallel schemes and their industrial applications.

UNIT V:

TEXT BOOKS:
1. “Modern control system Theory”, M.Gopal, Wiley eastern Ltd., New delhi
2. “Modern control Engineering”, K. OGATA, 3ed,prentice Hall of India(p) Ltd., New delhi

REFERENCES:
Course objective

- Able to classify types of Loads, to develop relationship between load factor and loss factor.
- Able to compute distribution substation rating, to list the derived through optimal substation location.
- Able to determine voltage drop and power loss calculations for Radial 3-phase balanced networks.
- Able to list the types of faults and protection devices. Able to explain the purpose of protection device.
- Able to explain the types of power factor improvement, able to determine the Capacitor (KVAR) rating for improving the power factor.

Course outcomes

On completion of course, the student will be able to

CO1: Classify types of Loads and develops relationship between load factor and loss factor.

CO2: Compute distribution substation rating, to list the derived through optimal substation location.

CO3: Determine voltage drop and power loss calculations for Radial 3-phase balanced networks.

CO4: List the types of faults and protection devices, to explain the purpose of protection device.

CO5: Explain the types of power factor improvement, Also he will determine the Capacitor (KVAR) rating for improving the power factor.

UNIT I:

General Concepts: Introduction to distribution systems, Load modeling 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.

Distribution Feeders: Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system.
UNIT II:
**Substations:** Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

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

UNIT IV:
**Protection:** Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, line sectionalizes and circuit breakers

**Coordination:** Coordination of Protective Devices, General coordination procedure, Fuse-to-Fuse coordination, Recloser-to-Recloser coordination, Recloser-to-Fuse coordination, Fuse-to-Circuit Breaker coordination, Recloser-to-Circuit Breaker coordination

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

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

TEXT BOOK:

REFERENCE BOOKS:
INSTRUMENTATION
(Elective-III)

Subject Code: 13EE4033  
Internal Marks: 30
Credits: 3  
External Marks: 70

Course objective

- To understand the monitoring and analysis of any physical system and its control.
- To describe different testing signals.
- To explain the different types of transducers, digital voltmeters.
- To explain the operation of signal analyzers
- To understand the process of measurement of non-electrical quantities.

Course outcomes

CO1: Be able to generalize the monitoring and analysis of any physical system and its control.
CO2: Be able to describe different testing signals.
CO3: Be able to explain the different types of transducers, digital voltmeters.
CO4: Be able to illustrate the operation of signal analyzers.
CO5: Be able to summarize the process of measurement of non-electrical quantities.

UNIT I:

UNIT II:
Transducers: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of resistor, inductor, LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Synchros, Piezo electric transducers, photo diodes.
UNIT III:
**Digital Voltmeters:** Digital voltmeters- Successive approximation, ramp, dual-Slope integration continuous balance type-Micro processor based ramp type DVM digital frequency meter-digital phase angle meter

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

UNIT V:

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

REFERENCE BOOKS:
1. Measurements Systems, Applications and Design – by D O Doeblin
2. Principles of Measurement and Instrumentation – by A.S Morris, Pearson /Prentice Hall of India
OPERATIONS RESEARCH
(Elective-IV)

Subject Code: 13EE4034 Internal Marks: 30
Credits: 3 External Marks: 70

Course objective

• Estimate the optimum value of the objective function of LPP and manage the industrial skill.
• Formulate a mathematical problem under different transportation problem and assignment problem. Also, find the minimum value of these problems. Calculate the solution of job sequencing problem.
• Apply the different strategies for calculation of the value of the game.
• Summarize the inventory theory and identify the costs involved inventory models.
• Apply Bellman’s principle of optimality and estimate optimal solution of Dynamic Programming problem. Also, solve the inventory and job sequencing problems by Simulation technique.

Course outcomes

CO1: Can solve the optimum value of objective function of Linear Programming problem.
CO2: Can construct and solve for (minimum value) of a mathematical problem under different transportation problem and assignment problem. Also, find the solution of job sequencing problem.
CO3: Can compute the value of the game under optimal strategies.
CO4: Can identify the cost of the inventory theory and solve the inventory problem.
CO5: Can calculate the optimum solution of Dynamic programming problem using Bellman’s principle of optimality. Also solve inventory and job sequencing problem using simulation technique.

UNIT I:

UNIT II:
Sequencing– Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines.
UNIT III:

UNIT IV:
Inventory: Introduction – Inventory theory - Costs involved in inventory problems - single item deterministic models-economic lot size models without shortages and with shortages having production rate infinite and finite.

UNIT V:

SIMULATION: Definition – types of simulation models (inventory and job sequencing problems) – applications of simulation – advantages and disadvantages.

TEXT BOOKS:
3. Introduction to O.R/Hiller &Libermann (TMH).

REFERENCES:
2. Operations Research: Methods & Problems / Maurice Saseini, ArhurYaspan& Lawrence Friedman
DIGITAL SIGNAL PROCESSING
(Elective-IV)

Subject Code: 13EE4035
Credits: 3

Course objective

- To study the different types of discrete time signals and systems
- To define the Discrete Fourier series.
- To calculate the Z-transform and Discrete Fourier transform for the different discrete time signals.
- To design a FIR and IIR filters using different techniques
- To implement the sampling rate conversion
- To identify the DSP Processor architecture and understand the function of each block.

Course outcomes

At the end of the course the student will be able to.

CO1: Discriminate the discrete systems based on their basic properties.
CO2: Determine the frequency response of different signals using DFT and FFT.
CO3: Design FIR and IIR filters using different techniques.
CO4: Use up and down sampling of signals in multirate signal processing.
CO5: Identify the architecture of DSP processor and understand the function of each element.

UNIT I:
Introduction: 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 transform: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT.
Fast Fourier Transform: Radix-2 decimation in time and decimation in frequency algorithms, inverse FFT and FFT for composite N.
Z - Transform: Definition, properties, ROC, inverse Z-Transform, relation between Fourier transform and Z-transform and applications.
UNIT III:
IIR Digital Filters: Solution of difference equations of digital filters, block diagram representation of linear constant-coefficient difference equations, basic structures of IIR systems (Direct form, Cascade form, Parallel form and Lattice – Ladder), transposed forms. Analog filter approximations – Butterworth and Chebyshev, design of IIR digital filters from analog filters (mapping of differentials, bi – linear transformation, impulse invariant method, matched z – transforms), design examples, frequency transformation (analog and digital domains), problems.

UNIT IV:
Multirate Digital Signal Processing: Decimation, interpolation, sampling rate conversion. Implementation of sampling rate conversion.

UNIT V:
Introduction to DSP Processors: Introduction to programmable DSPs, Multiplier and Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory, multiport memory, VLSI Architecture, Pipelining, Special addressing modes, On-Chip Peripherals. Architecture of TMS 320C5X- Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Registrar, Index Registrar, Auxiliary Register Compare Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, Some flags in the status registers, On-chip registers, On-chip peripherals.

Text Books:

Reference Books:
VLSI DESIGN
(Elective-IV)

Subject Code: 13EE4036
Internal Marks: 30
Credits: 3
External Marks: 70

Course objective

- Understand the VLSI design and VLSI technologies.
- Describe basic circuit concepts.
- Explain how to draw stick and layout diagram and scaling of MOS circuits.
- Know how to implement various designs using various gate logic.
- Demonstrate the basics of HDL, Synthesis and Simulation.

Course outcomes

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

CO1: Identify different MOS technologies for VLSI design.
CO2: Distinguish characteristics of CMOS and BICMOS.
CO3: Able to draw the stick & layout diagrams of various circuits.
CO4: Differentiate PLD’s for various VLSI circuits.
CO5: Can write HDL program for different circuits.

UNIT I:
Introduction: Introduction to IC technology, the IC era, MOS and related VLSI technology and basic MOS transistors. IC production process, MOS and CMOS fabrication process. Bi-CMOS technology and comparison between CMOS and bipolar technologies.

UNIT II:
Basic electrical properties of MOS and Bi-CMOS circuits: \( I_{ds} - V_{ds} \) relationship, aspects of MOS transistor: threshold voltage, trans-conductance, output conductance and figure of merit. Pass transistor, MOS inverter, determination of pull-up to pull-down ratio of NMOS. NMOS inverter driven by another NMOS inverter and driven through one or more pass transistors. Alternative forms of pull-up, CMOS inverter, MOS transistor circuit model, Bi-CMOS inverter and latch-up in CMOS circuits.
UNIT III:
VLSI Circuit design process: VLSI design flow, layers of abstraction and stick diagrams. Design rules for wires, contacts and transistor layout diagrams for NMOS and CMOS inverters and gates.
Scaling of MOS circuits: Scaling models, scaling factors for device parameters and limitations of scaling.

UNIT IV:
Gate Level Design: Logic gates and other complex gates, switch logic, alternate gate circuits.
Basic circuit concepts: Sheet resistance($R_s$) and its concept to MOS. Area capacitance calculations, delays, driving large capacitive load, wiring capacitances, fan-in and fan-outs and choice of layers.
Subsystem Design: Shifters, adders, ALUs, multipliers and parity generators.

UNIT V:
Design Methods: Design-capture tools and design- verification tools.
CMOS Testing: Need for CMOS testing, manufacturing test principles and design strategies for test. Chip level test techniques and system level test techniques.

Text books:

Reference books:
3. ASIC design - Smith.
POWER QUALITY MANAGEMENT
(Elective-IV)

Subject Code: 13EE4037
Credits: 3
Internal Marks: 30
External Marks: 70

Course objective:

- Introduction to custom power and study of factors governing power quality.
- Study of Power factor compensation techniques with power electronic devices and active Harmonic filtering.
- Introduction to measuring & solving power quality problems and particular standards relating to them.

Course outcomes:

CO1: Students will be examine different power quality issues and prepared to take up prospective projects assignment.
CO2: Students will be describe power distribution protection techniques and its impact on voltage quality.
CO3: Students will be plan to trained the work for improvement and betterment of power quality.
CO4: Students will be distinguish basic harmonic phenomena, methods for dealing with harmonic distortion.
CO5: Students will be read theoretically and practically for monitoring of power quality.

UNIT I:

UNIT II:

UNIT III:
Electrical Transients: Types and Causes of Transients, Atmospheric Causes, Switching Loads On or Off, Interruption of Fault Circuits, Capacitor Bank Switching, Motor Start Transient, Power Factor Correction, Capacitor Switching Transient.
UNIT IV:

Unit- V:

TEXT BOOKS:

REFERENCE BOOKS: